SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE, PUBLISHED MONTHLY

VOLUME XIV FEBRUARY, 1912 NUMBER 2

CANCER OF THE STOMACH: ITS SURGICAL CURE[1]

BY WILLIAM J. MAYO, M. D., ROCHESTER, MINNESOTA

IN all the history of disease, there is no authenticated case in which a cancer of the stomach has been cured by medical means. Yet for some reasons which are apparent, and others which are not apparent, cancer of the stomach is treated by the physician, admitted to medical wards in hospitals, and only rarely is a surgical consultation considered necessary.

Of all known diseases, cancer of the stomach is the one that should be considered surgically. Appendicitis is recognized as a surgical malady by practically the entire medical profession of the civilized world, although a large percentage of the cases would recover under non-surgical treatment. Strangulated hernia is considered purely surgical, and any practitioner failing to have such a case operated upon promptly would be severely criticized, yet, occasionally, an artificial anus forms spontaneously and the patient recovers.

Cancer of the breast is recognized as wholly within the domain of surgery, yet the cancer quack, with his plaster, cures an occasional case. Cancer of the stomach does not have even the remote chance of the quack's occasional cure.

When brought face to face with the fact that cancer exists in the stomach, the apathy of the medical profession is only equaled by that of the patient. To merely diagnose cancer of the stomach is enough to satisfy the patient, the family, and the friends, and it is received with an oriental-like resignation as being the fate from which there is no escape. What are the facts? Cancer of the stomach, when still localized, gives operative results as good as those after operation for cancer in any other part of the body. Carcinoma in this organ has no higher grade of malignancy, nor is the operation for its removal more difficult than operations for the cure of cancer in other organs of the gastro-intestinal tract. If we examine in detail the causes which, up to the present time, have left the patient having cancer of the stomach, to his fate, we will find them centering in three groups: first, the supposed prohibitive mortality of the operation itself; second, the improbability of cure provided the operation is successful; and third, the difficulty of securing a sufficiently early diagnosis upon which to base an operation.

The operation of pylorectomy and partial gastrectomy originated with that master surgeon, Billroth, who made the first successful operation, although Pean, the brilliant but eccentric French surgeon, performed the first operation. The mortality in Billroth's cases was 64 per cent. We must remember that Billroth was not only a pioneer in gastric surgery, but that his work was pioneer work in abdominal surgery, when the average death rate in any kind of an abdominal operation was close to 40 per cent. In Billroth's time operations upon the stomach were prolonged,

[1] Read before the Clinical Congress of Surgeons of North America, Philadelphia, November 9, 1911.

and the control of hæmorrhage was inefficient. In speaking of his work Billroth said: "The patients left the operating table in shock, from which some of them recovered." Billroth was subjected to much harsh criticism, because then, as now, there were conservative men — conservative, however, not in the sense of conservation, but the "do nothing" type. They looked with horror on this mortality of 64 per cent, never realizing that their own mortality was 100 per cent. Shortly before his death, Billroth said that his life was saddened by the number of patients with advanced malignancy who seemed to be attracted to his clinic. Why were these patients attracted to Billroth's clinic? Because he was almost the only man of his generation who gave them a chance.

From Billroth's time to the present, the operative mortality following partial gastrectomy has been steadily diminishing. In the last 100 cases operated upon at St. Mary's Hospital, there was a mortality of 7 per cent; in the last 50 cases, 4 per cent; nor are these figures exceptional.

When we come to the question of permanence of cure, we approach a somewhat difficult subject. At one time, the patient who remained well three years was considered cured. This time-limit has been increased to five years, but as a matter of fact, there is no definite period beyond which the disease may not return. A high percentage of patients who survive the operation five years are cured, and a large majority who remain well for three years are cured. After five years have passed it is difficult to determine whether a growth which appears is a continuation of the original disease, or a new growth foreign to the first.

Of the 360 resections of the stomach performed in St. Mary's Hospital up to Nov. 1, 1911 (C. H. and W. J. Mayo), 53 have been eliminated from these statistics because the operation was performed for a tumor which proved to be benign, for ulceration or its results, or because no microscopic examination was made of the specimen. Of the 307 resections of the stomach for known carcinoma, 150 of the patients were operated more than three years ago; 20 died from the results of the operation, and we were unable to trace 40. This gives 90 patients who recovered from the operation, and whose present condition we have been able to trace. Of this number 33, or 36.6 per cent, are alive. Of the 93 patients operated more than five years ago, fifteen died and twenty have not been heard from as to their present condition. Of the remaining 58, 13, or 22 per cent, are known to be alive and well over five years. Every death occurring within the five year period has been classed as a death from return of the cancer without regard to the actual cause which is an injustice to the statistics, since the normal death rate for five years of individuals the age of these patients is at least 8 per cent. These data would indicate that the patient with a cancer of the stomach which is sufficiently localized to be removed radically has better than a 90 per cent chance to recover from the operation, and better than a 36 per cent chance of a three-year cure, and at least a 25 per cent chance of a five-year cure.

Gastrojejunostomy for the relief of pyloric obstruction from advanced cancer has proved such a pitiful palliation that we now submit many of our patients to resection if the disease is locally removable without the expectation that the patient will be cured. Gastrojejunostomy gives, on an average, five months of temporary respite which is not all relief. The ulcerating carcinomatous mass in the stomach, with its foul debris, and septic discharges which pass down into the intestinal canal along with the food, by no means makes ideal palliation. On the other hand, gastrectomy relieves the patient at once of the local condition, and gives an average prolongation of life of over 12 months. When death does occur, it is usually from painless metastasis in the internal organs. The nutrition, strength, and the ability to work are maintained by the patient until shortly before death.

When we study the question of early diagnosis of carcinoma of the stomach, we come to the most difficult part of the problem. In this connection, it will be wise to eliminate all of those elements in the diagnosis which, in the early stages, are of little value, and waiting for them to develop usually means waiting until the case becomes hopeless. Occasional-

ly, one receives a letter from some practitioner saying that he has made a diagnosis of cancer of the stomach and is sending the patient for operation. He gives in detail all of the various laboratory tests, and the different phases of the case as they appeared from week to week until he finally became convinced that a diagnosis of carcinoma of the stomach was established. This is not a case for the surgeon, but for the undertaker. The waiting for the diagnosis to be established carries with it the prognosis.

Do not understand me as wishing to decry, in any way, the laboratory methods of diagnosis, because they are aids, but they are only aids. The question of gastric acidity is of little value when standing alone, the acidity of the gastric juice and especially the amount of free hydrochloric acid will usually be reduced in cancer of the stomach but the patient who has cancer developing on ulcer may have high acidity, with free hydrochloric acid in excess, while many patients with chronic disease, such as chronic pancreatitis, pernicious anæmia, etc., may have low acidity, or there may be no acid present. Benign obstructions are often marked by low acidity, absence of free hydrochloric acid, and lactic acid and the bacillus of Oppler-Boas may be present.

Occult blood, which has been heralded as a diagnostic sign of great magnitude, is by no means such. It may be present as a result of a little blood due to traumatism from passing the stomach tube, or the rough use of a tooth brush. It has significance only when taken into consideration with the history and clinical aspects of the case.

The laboratory examination of the gastric contents must be regarded as a part of the clinical examination, to be taken seriously only in connection with the history and symptoms of the patient. The X-ray, like the laboratory analysis of the gastric secretions, is of small value in the early stages. The gastroscope and the gastrodiaphanoscope have not as yet been proven to have definite value in the average case. Sero-diagnosis, etc., is in the purely experimental stage.

Upon what, then, are we to base an early diagnosis? The stomach can be divided into

Fig. 1. Showing lymphatic supply of stomach and lines of section for radical removal of carcinoma of the pyloric end.

two unequal parts by dropping a line downward from the cardiac orifice. All of the stomach which lies to the left, composed of the dome and fundus, has but few lymph channels and they drain to the left into the glands in the splenic area and to the glands about the cardiac orifice. Cancer in this region, except about the cardiac orifice, occurs but rarely.

The smaller or pyloric portion, composed of the lesser curvature and antrum, is definitely independent of the body of the stomach, is very largely supplied with lymphatics, and is the seat of more than 80 per cent of all carcinomata of the stomach. (Fig. 1.) This is the part which can be palpated, and which can be removed. Cancer of the fundus will seldom give symptoms in time to enable a radical operation to be performed. This is also true of those tumors of the pyloric end which lie high on the lesser curvature.

It may be stated as an axiom that carcinoma of the stomach *per se* does not produce symptoms upon which an early diagnosis can be based. When a growth develops in the palpable part of the stomach (pyloric end) or introduces obstructive phenomenon by narrowing the lumen, we can establish a diagnosis sufficiently definite to indicate operative interference. Therefore, finding a movable tumor in the pyloric end of the

stomach, or discovering remnants of food in the stomach from eight to ten hours after eating, are the two most important and, one might say, the only definite early signs of cancer upon which a diagnosis can be based, and if such findings are in accord with the clinical data, an exploratory incision is indicated. Not that the exploratory incision should be reserved for these cases only, but the patient and the patient's relatives and friends have a right to demand why exploration was not done, if it has been delayed beyond the earliest discovery of such signs. It is true that benign lesions, such as ulcer and its results, may give rise to both tumor and obstruction, but under such circumstances these conditions should also be considered surgically.

It does not require a high order of skill to feel a mass in the pyloric end of the stomach, nor need one be a laboratory specialist in order to discover food remnants. The patient is advised to take with the evening meal some half-cooked rice and a few raisins. In the morning, before breakfast, when the stomach should be empty, the stomach tube is passed. If food remnants are found on several occasions, and the patient's history and a general examination give data suspicious of cancer of the stomach, the responsibility of delay in exploration should be placed upon the patient.

What percentage of the total number of carcinomata of the stomach can be expected to prove surgical? At the present time, not more than one-half of the cases could be diagnosed sufficiently early to perform a radical operation. With some exceptions, we cannot expect to successfully remove a cancer which involves the cardiac orifice, and we cannot often expect to make a diagnosis in time to remove carcinomata which lie along the lesser curvature in the cardiac portion of the pyloric end of the stomach, because the involved part lies concealed under the rib margins, and the lumen of the stomach is too wide to be obstructed by a small growth.

I believe that fully one-half of all carcinomata of the stomach are situated in the pyloric end, or have their origin in the fundus in such portions as are open to palpation; situations that give rise to tumors, obstructions, or other evidences which should lead to exploration.

Operability, then, depends largely upon the location of the disease in the stomach. Carcinomata in the pyloric antrum with an occasional growth in the body of the stomach, comprise the large majority of cases in which radical removal is practicable.

Complete gastrectomy for cancer has not been a very successful operation. The mortality has been high, and I do not know of any record of a patient remaining well five years. It is not often the extent of the disease in the stomach which renders the case inoperable, but glandular metastasis, and extension to neighboring organs. The cases in which complete gastrectomy is indicated belong to the small group of the malignant fibrosis type, the so-called "leather-bottle stomach." We have never actually made a complete gastrectomy, although in seven instances we removed nearly all of the stomach. In each instance, however, a small portion of the normal stomach wall about the cardia was saved. Three of these patients died as a result of the operation, and not one of the four who survived the operation lived two years.

In the 863 operations for gastric cancer, we were able to do the radical operation in 307, the remainder being gastrojejunostomies or gastrostomies, for palliation, or explorations. The explorations did no good; occasionally they were harmful. Of the 303 explorations, in which hopeless disease was found, 6 died in the hospital. These deaths were not usually immediate, but the patients, lingering along a few weeks, were never able to return home. It certainly was unfortunate to have these patients, whose condition was hopeless, die away from their homes, their family and friends.

This brings up the question: What shall constitute inoperability without actual exploration? (Palmer.[1]) The proof that a patient has inoperable carcinoma of the stomach depends upon six different kinds of evidence. (1) The cachectic patient with marked evidence of progressive gastric trouble which has lasted over a period of a number of months, in which a fixed tumor lying to the

[1] Palmer: Surg., Gyn., and Obst., Feb., 1910, pp. 154–156.

left is present. Such a case would be clearly hopeless. (2) It frequently happens that the patient with carcinoma of any of the abdominal viscera will have an escape of cancer cells into the peritoneal cavity. These will drop, by gravity, to the bottom of the pelvis and become attached often to the sigmoid. The "feel" of these various small metastases upon rectal examination is very characteristic. In women, not infrequently transplantation to the ovary occurs, setting up a secondary malignant cyst. The majority of cases of malignant adeno-carcinomata of both ovaries have such origin, and women are sometimes unnecessarily submitted to operation for their removal. (3) The supra-clavicular fossa, especially the left side, should be examined for carcinomatous glands. (4) Carcinoma cells free in the abdominal cavity can be carried by the lymphatics to the umbilicus, forming a distinct mass like a button. In doubtful cases we remove, under local anæsthesia, a little portion of this "button umbilicus" for microscopic examination. (5) Metastatic deposits, giving rise to nodular tumors in the liver or peritoneal cavity. (6) Ascetic accumulations in the abdominal cavity, taken in connection with the history of the patient, have some value. It is necessary to eliminate other causes of ascites; for example, the heart, liver, kidneys, tuberculous peritonitis, etc.

It has been shown by Keen[1] that no case of carcinoma of the skin had ever been reported which did not begin in a pre-existing lesion. As we become more familiar with the nature of carcinomata of the internal epithelial surfaces of the body, we must regard this statement as probably true of the gastro-intestinal tract as well. Chronic ulcer is the most common of the known pre-existing lesions in the stomach. In a study of 218 pathologic specimens of gastric carcinomata removed in our clinic[2], it was definitely shown that more than half had their origin in chronic gastric ulcer—an indication that the lesion should be excised in all cases of chronic calloused ulcer of the stomach when practicable.

Cancer of the stomach is the most frequent and the most hopeless form of cancer in the human body. Early operation affords the victim the only chance of a cure.

[1] Jour. Am. Med. Ass'n., July 9, 1911.

[2] Wilson and MacCarty: Amer. Jour. Med. Sci., Dec., 1909.

A STUDY OF THE EFFECT OF CONSTRICTION BY MOMBURG'S TUBE ON BLOOD PRESSURE, PULSE RATE, RESPIRATION, AND TEMPERATURE

By FRED L. ADAIR, M. D., Minneapolis, Minnesota

Instructor in Obstetrics and Gynecology at the University of Minnesota; Obstetrician to Minneapolis City, Asbury, and St. Barnabas Hospitals

THIS experimental study was begun nearly two years ago. The cases were quite carefully selected in order to exclude conditions which might contraindicate the use of the tube. Especial attention was given to the general condition, the blood, heart, vessels, the thyroid gland, the temperature, and nervous condition of the patients. Any case presenting anything decidedly abnormal in any of the above mentioned things was excluded as not suited for observation. The work was all done at the Minneapolis City Hospital and I wish to express my appreciation of the great kindness of the internes and nurses who assisted in making the observations, and especially to the patients who so kindly volunteered to endure the rather unpleasant application of the tube.

All observations were made on puerperal patients in the supine position without the use of an anæsthetic. The duration of the application was necessarily for a rather short time. The various observations were made as

nearly synchronously as possible, one person taking the pulse and respirations, another observing the blood pressure. The responsibility for the application and maintenance of the proper amount of constriction with the "Momburg Tube" was taken in all cases by the author. The temperature was taken by mouth; it would have been interesting to have observed the rectal temperature at the same time. This was not brought to my mind until too late for this series of observations.

Neither the Esmarch bandages nor the Trendelenburg position were tried in any of the cases.

No attempt will be made in this article to consider exhaustively the "Momburg Tube." It does seem best however to preface the detailed observations of these cases with a short review of the literature dealing with the phases of the question which are to be described in this article.

A fairly complete bibliography is appended to assist those who may wish to study the procedure more carefully.

Momburg began to study this method of elastic constriction in 1903. He corresponded with Esmarch regarding the possible usefulness of the method. The opinion of Esmarch was that there was great possibility of injury to the intestines; this opinion has not been confirmed by experiment or practice.

In 1908 Momburg published a description of his method and reported a few cases where it had been used operatively. Previous to making practical use of the method to control hæmorrhage from the lower half of the body in operative cases he had made many experimental tests on animals and had demonstrated the harmlessness of the application to man for short periods of time.

At first only the surgical uses were studied but it was not long until application of the method to the control of postpartum hæmorrhage was tried.

Sigwart published early in 1909 a report of some cases of postpartum hæmorrhage in which he had used the method successfully. A little later Hoehne published an article based on experimental work and the practical application to cases of postpartum hæmorrhage. It may now be said to be established as a valuable means of checking or controlling postpartum hæmorrhage. Liepmann in a recent work advises that every practitioner of obstetrics should carry a rubber tube in his bag and use it in all cases of postpartum hæmorrhage, whether atonic or traumatic.

The use of the method has been extended to surgical procedures both elective and emergency where it is not easy to control hæmorrhages from the lower half of the body as well as to cases occurring in obstetric and gynecologic practice.

Numerous cases of the successful use of this method have been reported. Unfortunately it is not an absolutely safe method and some fatal cases have been attributed to the use of this constriction. It is however too valuable a method to be discarded for this reason. In emergency cases it is justifiable as a means of saving life, and fortunately many of these people are those in whom the method is the least dangerous. The class of cases in which the method is dangerous will be considered later.

The technique is comparatively simple but it is very essential that certain points be kept carefully in mind. The femoral pulse is the index of the amount of constriction to be used.

One needs a good elastic rubber tube of about the size of the finger and about two yards long. This is passed under the patient's back and stretched to its fullest extent and brought across the abdomen, midway between the lower border of the ribs and the iliac crests. A second lap is then taken around the waist. Two wraps of the tube may suffice to shut off the femoral pulse but enough may be taken to accomplish this result. When tightened sufficiently it is held, clamped or knotted in position.

It is important to use *only* enough constriction and only a sufficient number of wraps of the tube to shut off the femoral pulse. More than this is apt to do unwarranted harm. In postpartum hæmorrhage one should use enough constriction to check and control the bleeding. The greater danger here lies in using enough constriction to impede the venous circulation but not sufficient to shut off the arterial flow. This aggravates rather than checks the hæmorrhage.

Rimann and Wolf found by studying the site of application on cadavers that the tube crosses the abdominal vessels between the third and fourth lumbar vertebræ about the site of the branching off of the inferior mesenteric artery. Thus the tube compresses the aorta, vena cava, spermatic, inferior mesenteric, and some branches of the superior mesenteric arteries. They demonstrated by animal experiments that the compression of portions of the superior mesenteric artery is responsible for more circulatory disturbance than the pressure of the other blood-vessels. They found a rise in blood pressure during the application of the tube and a rapid fall following its removal.

This change in blood pressure associated with pulse changes is the dangerous factor in using this method.

The individuals whose organs cannot compensate for these rapid changes are the ones in whom the use of "Momburg's Tube" should be avoided.

It is more dangerous in those who present marked arterial changes; cardiac disease, and alterations in the blood itself (anæmia).

The time in the procedure which is most dangerous is when the tube is removed. Momburg advises the use of the Trendelenburg position and constriction of both lower limbs. The tube should be loosened slowly and following its removal the constriction of one leg should be removed and later that of the other.

So far as the use in postpartum hæmorrhage is concerned the greatest thing to be feared is the acute anæmia, for they are generally healthy individuals.

Various observers have studied certain phases of the effect of this procedure on different bodily functions. Ehrlich noted a persistent subnormal temperature in a young girl following the use of the "Momburg Tube." He made some experiments on animals from which he concluded that the application of the tube caused a fall in the temperature which he attributed to a diminished heat production from shutting off the musculature of the lower extremities.

The pulse may show changes during the time when the tube is applied but they are usually not serious. When it is removed the pulse usually becomes more rapid and smaller. Rimann and Momburg have both observed dicrotism following removal. These changes are important for most of the fatal cases have died in collapse with marked cardiac symptoms.

These symptoms may be prevented to some extent by the use of constriction of the lower extremities and the Trendelenburg position.

Tornai investigated twenty cases and found that the blood pressure rose 20-30 or even 50-60 mm. of mercury during application and fell 5-15 mm. after removal. He thinks that the use of the Esmarch bandages has no appreciable effect on the variations in blood pressure. zur Verth from like observations on ten cases reports similar findings but advises the use of Esmarch constriction. He thinks that it should be removed about ten minutes after taking off the "Momburg Tube."

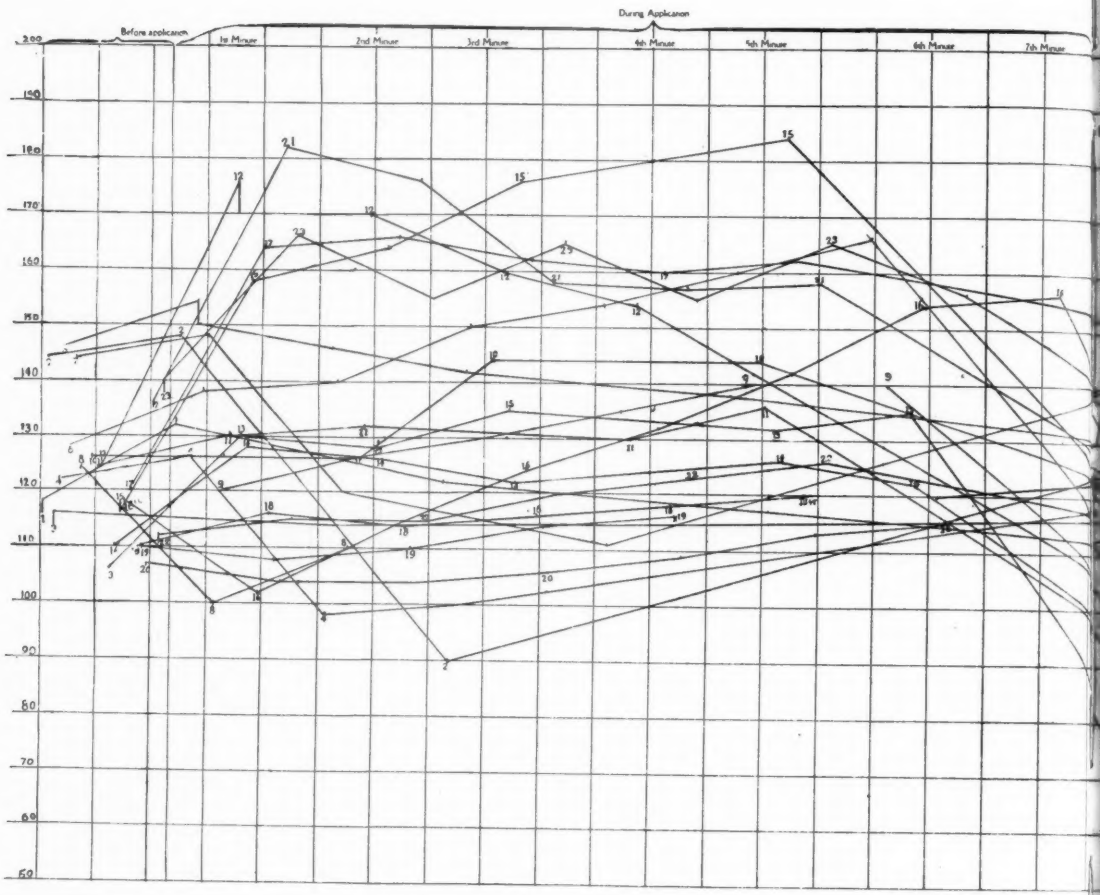
Some writers state that the respirations are not affected and others think that the rate is increased during the application of the tube.

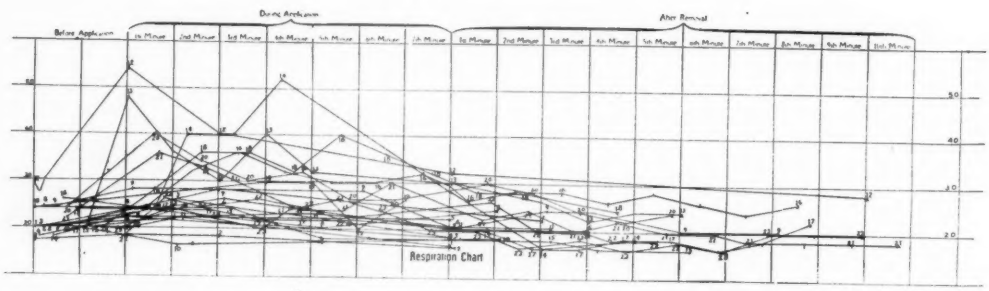
This rather brief consideration of the literature leads to a description of my own findings in an experimental study of 23 cases.

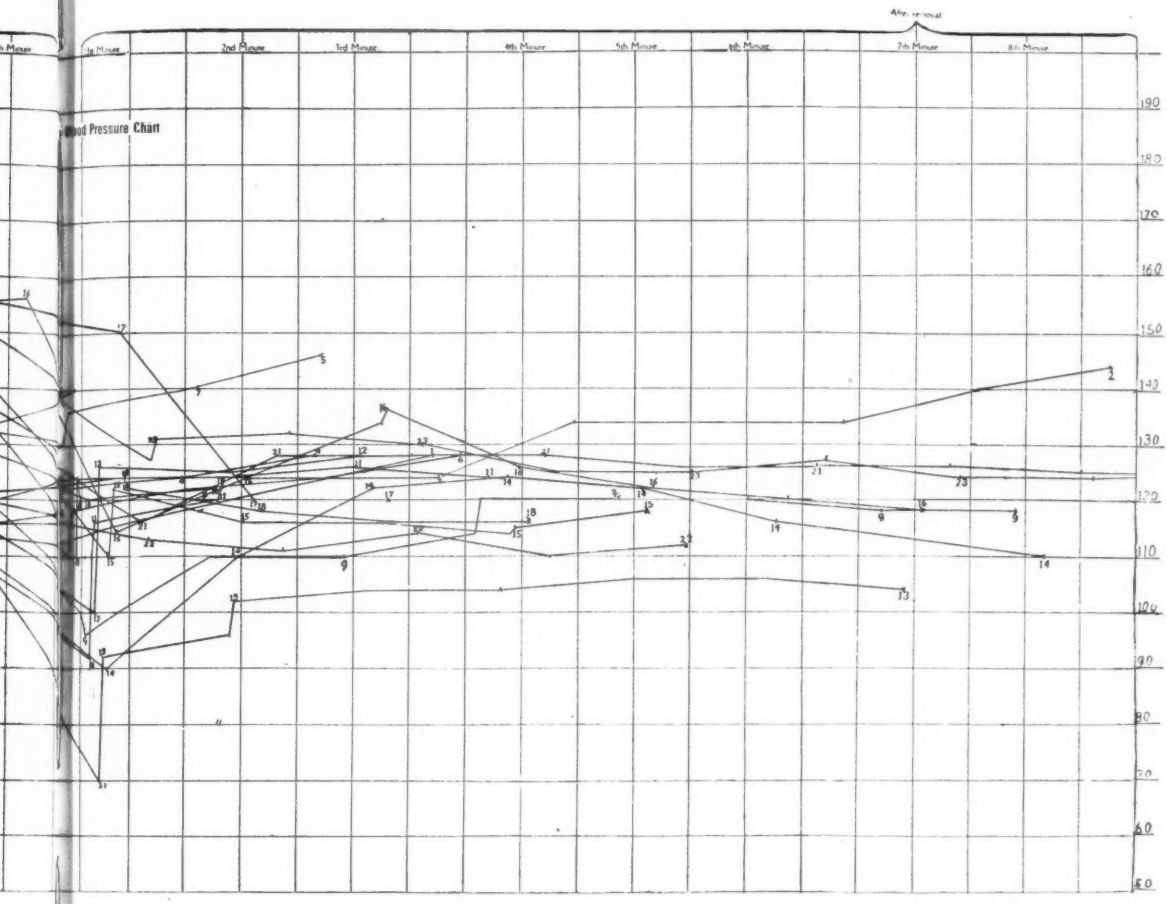
Observations were made of the pulse rate just before application, during constriction, and following removal of the tube as nearly synchronously as possible with the other observations. The radial pulse was taken on the side opposite to that on which the blood pressure was measured.

The maximum pulse rate during the application of the tube exceeded the normal, taken just before application, in 21 cases. The greatest increase was 74 beats and the least was three. The average increase in the maximum rate was 29.3 beats per minute. The highest rate during application was less than the normal in two cases, one showing a decrease of eight beats and the other of one; the average decrease being 4.5 beats.

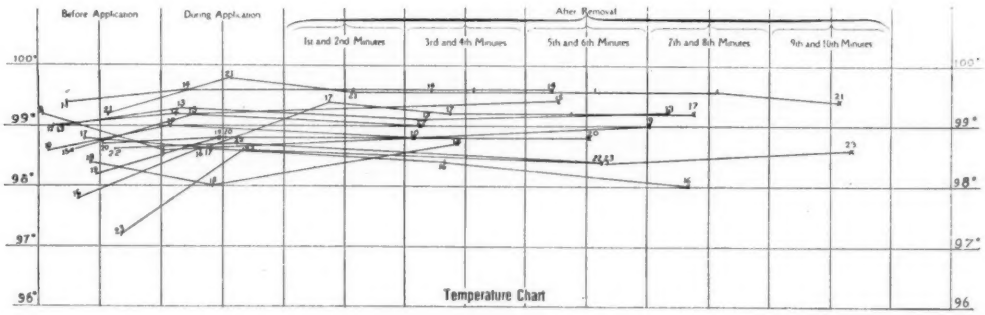
The minimum rate while the tube was applied equaled the normal three times. It was less in six cases; the smallest decrease was one and the largest 16 beats; the average was 9.16 beats. It was greater than the normal in 14 instances, the least difference was three, the


During Application
Before application
1st Minute
2nd Minute
3rd Minute
4th Minute
5th Minute
6th Minute
7th Minute
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50


During Application
After Removal
Before Application
1st Minute
2nd Minute
3rd Minute
4th Minute
5th Minute
6th Minute
7th Minute
8th Minute
9th Minute
10th Minute
50
40
30
20
Respiration Chart



Blood Pressure Chart



Temperature Chart

greatest was 38 and the average increase was 14.64 beats per minute.

The maximum rate after removal of the tube exceeded that during its application in five cases. The greatest difference was 16 and the least three. The average increase was 10.6 beats. In 17 instances it was less after removal, the greatest decrease was 44 and the least was two. The average decrease was 21.4 beats per minute.

The minimum rate after releasing the constriction exceeded that while the tube was applied in three cases with an average increase of 2.3 beats per minute. In one instance they were equal. There was a decreased rate 18 times, the greatest fall being 46 and the least two beats per minute. The average diminution was 20.8 beats per minute.

The maximum rate after removing the tube exceeded the minimum during its application nine times. The least increase was three and the greatest was 40 beats per minute. The average increase was 28 beats. They were equal in two cases. This maximum rate was lower in eleven cases. The greatest difference was 48 and the least eight beats. The average decrease was 29.4 beats per minute.

The minimum rate after removal was lower than the maximum during application in all but one case, in which it was greater by three beats. The smallest decrease in rate was two and the greatest 70 beats. The average diminution was 29.7.

The maximum rate after removal exceeded the normal 17 times. The greatest difference was 49 and the least two beats per minute. The average rise in rate was 20.3 beats. This maximum was less in five cases with a greatest difference of 16 and a least of two beats per minute. The average decrease was 9.2 beats.

The minimum rate after removal equaled the normal twice; it was greater in two cases and less 18 times. In the two cases showing an increase the greatest difference was eight and the least two beats with an average rise of five beats per minute. In the 18 cases the smallest fall was two and the greatest 32 beats below the normal. The average decrease in rate was 11.4 beats per minute.

The application of the "Momburg Tube" causes an increase in the pulse rate which shows a tendency to reach the normal after the tube has been applied for a few minutes. Probably the decreased volume of blood which the heart has to pump makes it beat faster. This is gradually adjusted and the rate becomes more nearly normal.

When the tube is removed new channels are opened and the heart "races" but soon becomes slower; in fact the rate is usually slower than the normal after the tube has been off for a short time.

The respirations were counted in all the cases just before the tube was applied, during the constriction and after the removal of the tube. The maximum rate during the time of application was greater than that just before in all but three cases. The minimum was below the normal in three of the 20 cases. The greatest increase was 34 and the least was one respiration per minute. The average of the maximum increase was 10.0, of the minimum increase 4.6. In two cases the minimum equaled the normal rate. In the three cases showing a minimum below normal the average decrease was 2.7, the greatest decrease was four and the least was two respirations per minute. Two of the three cases in which there was a decrease below the normal rate had a maximum equal to it. The average minimum decrease was 3.3 per minute.

The maximum rate after removal of the tube was equal to the minimum during application in eight cases, it was higher in six, and lower in all but two of the remaining cases in one of which no observation was made. The greatest increase was four, the least was two and the average rate of increase in the six cases was 3.7 per minute. The maximum after the removal of the tube was lower than the minimum during its application eight times with an average decrease of six. The greatest decrease was eight and the least two per minute. The maximum rate after removal was lower than that during application in 18 cases. The greatest fall was 24, the least two and the average 8.3 respirations per minute.

The minimum rate after taking off the tube was equal to the maximum rate before its removal in two cases, greater in one, less in nineteen, and not taken once. In the one case the increase was only two per minute. The

greatest fall was 36, the least two, and the average rate of decrease in the 19 cases was 10.8 per minute.

After the tube was removed the maximum rate exceeded the normal ten times, equaled it in six, and was less in six cases. In one case no observation was made. The average excess in the ten cases was 5.5 the largest increase was ten and the smallest two respirations per minute. The six cases showed an average decrease of 2.1, the greatest was four and the least one per minute.

The minimum rate after removal was greater than the normal in four instances, was equal to it five times and less in thirteen cases. The greatest increase was four, the least one and the average was 2.25. The average decrease was 3.15 the largest being eight and the smallest one per minute.

It is thus seen that the respirations increased during the constriction and returned approximately to the normal rate soon after the tube was removed.

The causes of the increase in the number of respirations are various, but one of the most important factors is doubtless the crowding upward of the diaphragm by displacement of the abdominal organs. This interferes with diaphragmatic breathing and decreases the volume of air which enters the lungs. The discomfort from the constriction and the increased pulse rate probably influence the respirations to some extent.

Observations of the oral temperature were made in 14 instances. In eleven of these the temperature rose during the application of the tube, the maximum rise was 1.4° F. and the minimum 0.1° F. The average in these cases was 0.5° F. The temperature decreased three times with a maximum fall of 0.6° F. and a minimum of 0.2° F., the average being 0.4° F.

After the removal of the tube the temperature was taken during the following five to ten minutes. In seven cases there was a diminution from the point reached during the application of the tube. The greatest fall was 0.6° F., the least was 0.2° F., and the average was 0.3° F. Three of the four cases showing a rise after the removal of the tube were those in which the temperature fell during its application. The minimum rise was 0.2° F. and the maximum 0.8° F. and the average 0.5° F. Two cases showed no change in the temperature after the removal of the tube and in the remaining case no observation could be made.

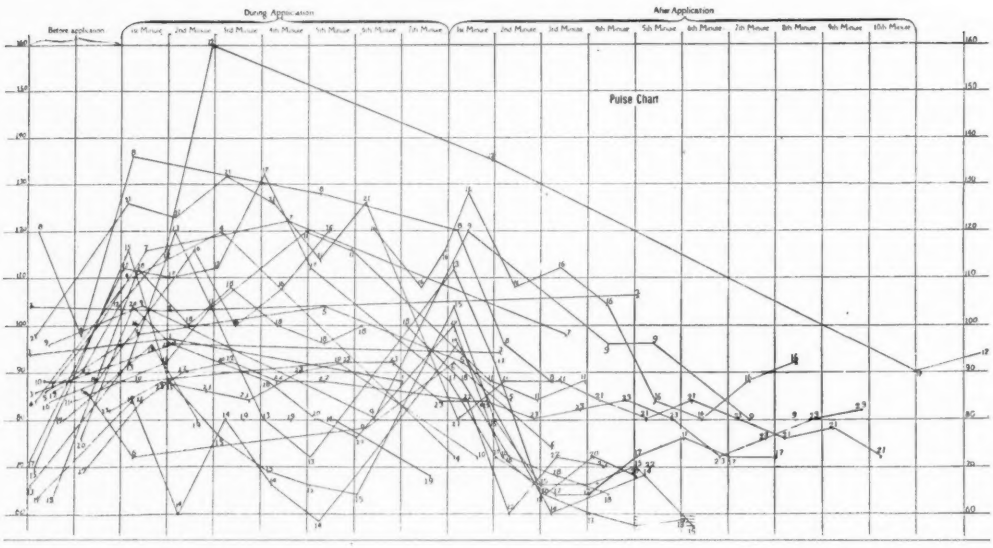
Various explanations might be presented to account for the thermal rise but there are two causative factors which are of great importance. Vierordt states that 14.5 per cent of the total heat loss of the body is by evaporation and 73 per cent by radiation and conduction from the skin. These percentages may vary greatly under different conditions but the figures show the importance of the skin in affecting the body temperature. The application of the "Momburg Tube" prevents the skin of the lower half of the body from affecting the temperature of the upper half through evaporation, radiation, or conduction.

It is well known that the temperature in the great vessels and organs of the body is higher than that of the surface. The blood from these organs in passing through a smaller circuit might raise the temperature of the superficial parts to a relatively higher point. It is thus possible to have the mouth temperature raised by diminished heat loss and from a supply of warmer blood to the capillary system of the skin and mucous membrane.

The idea of Ehrlich that the temperature is lowered by the application of the tube thus shutting off the muscles of the lower half of the body may be true where the tube is applied for a long time. His experiments are hardly conclusive because most of his observations of the temperature were made per rectum on quadrupeds. One would naturally expect the temperature taken per rectum to be lower than normal during this procedure.

It is difficult to explain satisfactorily the fall in temperature in three cases. It was difficult to shut off the femoral pulse in all of them; more so than in any of the other cases. There was cyanosis of the lower extremities preceding successful constriction. It is not difficult to understand how an increased quantity of blood in the lower portion of the body might cause a reduction of the temperature in the upper portion.

The temperature after removal of the tube was lower than that taken before application



in only two cases. In each of these the fall amounted to 0.2° F.

The blood pressure was measured by the Faught instrument in all cases where the Riva Rocci apparatus is not specified. The observations were made just before the application of the tube periodically during its application and after its removal.

The maximum blood pressure during the application of the tube was above the normal (the pressure taken just before the constriction) in all except two of the cases. In one of these it equaled the normal, in the other it was 14 mm. less. The average increase in the maximum during the application of the tube was 22 mm. The greatest rise was 68 mm. and the smallest 4 mm.

The minimum pressure while the tube was applied exceeded the normal in twelve cases, equaled it in two, and was lower nine times. The average excess was 17.25 mm. in the twelve cases. The greatest increase was 40 mm. and the smallest 3 mm. The average decrease in the nine cases was 18.66 mm. The greatest fall was 54 mm. and the least 2 mm.

The maximum pressure after removal of the tube exceeded that during its application in four cases, with an average increase of 5.5 mm. The largest increase was 14 mm. and the smallest 2 mm. It was diminished after removal in 17 instances with an average decrease of 23.8 mm. The greatest fall was 62 mm. and the least 4 mm.

The minimum blood pressure after taking off the tube was greater than that during its application seven times with an average rise of 15.3 mm. The greatest rise was 34 mm. and the least 2 mm. In the remaining 14 cases it was less, with an average diminution of 30.3 mm. The most marked fall was 58 mm. and the least 5 mm.

There was an increase in the pressure after removal of the tube above the minimum during application in nine cases with an average rise of 21.4 mm. The largest increase was 54 mm. and the smallest 2 mm. The maximum after removal equaled the minimum during constriction once. In the remaining eleven cases it was less with an average fall of 15.4 mm. The greatest decrease was 36 mm. and the least one mm.

The lowest pressure after taking off the tube was the same as the highest measurement during constriction in one case. It was greater by 2 mm. once. In the other 19 cases it was less with an average of 38 mm. The most marked fall was 66 mm. and the least 4 mm.

The maximum blood pressure after the tube was taken off exceeded the normal eleven times with an average increase of 9.2 mm. The largest increase was 30 mm. and the smallest 2 mm. They were equal six times. It was less in the remaining four cases with an average of 5.5 mm. The greatest fall was 8 mm. and the least 4 mm.

The minimum after removal was greater than the normal by 6 mm. in one case. They were equal in two cases. In all of the other 18 cases it was less with an average decrease of 15.2 mm. The most marked fall was 36 mm. and the least 2 mm.

In two cases the normal pressure was not reached within an hour after the use of the constrictor.

It is difficult to explain all the variations of blood pressure in the different cases. The general rise in blood pressure during the application of the tube might be explained in part by the same force of the heart being applied to a smaller volume of blood.

The usual decrease after removal of the tube might be accounted for by the sudden opening of new channels which may be dilated beyond their normal capacity as shown by the vasodilation which occurred in some cases. It is very easy to see how a poorly balanced circulatory system or one with a small margin of compensatory power might be seriously affected by these sudden changes.

It is impossible to state from these observations how the constriction causes the changes in the blood pressure. It could not be determined whether the conclusions of Rimann and Wolf regarding the effect of compressing the superior mesenteric artery on the blood pressure are correct.

The changes have been considered collectively and those who wish may follow the changes in the individual cases as described in the case reports.

It is also easy to isolate the cases from the accompanying table and composite charts which show the changes in pulse, respirations, temperature, and blood pressure in the individual cases.

In these charts each case is represented by a line which bears the number corresponding to that given in the description of the case.

CASE 1. H. S. Age nineteen years. Primipara. Confined March 31, 1910. Urinalysis on April 14th, negative. Date of observation was April 24th. Fundus of uterus not palpable above the pubes. Cardiac dullness extended from the left sternal border to the third rib above and to a point within the mammillary line. The heart tones were clear. Before the application of the tube, the radial pulse was 94, the respirations 20, the blood pressure 116–118. During the application, which lasted three minutes, the pulse was 97 and the respirations 22. The blood pressure rose rapidly to 132 and then decreased to 122. After the removal of the tube the pulse was 88 and the respirations 16. The blood pressure fell to 112 and rose to 118. There was no great unpleasantness or discomfort from the application of the tube.

CASE 2. L. K. Age 42 years. Multipara III. Confined April 13, 1910. A case of placenta prævia, delivered by forceps. Urinalysis on April 18th was negative. Hemaglobin on April 26th was 40 per cent. Red blood cells 2,424,000. Date of observation was April 24th. Fundus not palpable above the pubes. Cardiac dullness extended from the left sternal border to the third rib to a point inside the nipple line. There was a faint impurity of the first sound at the apex. Before the application of the tube, the pulse was 104, the respirations 17, and the blood pressure 144. During the application, which continued three minutes, the pulse was 103 and the respirations 18. The blood pressure at first rose to 148 and then rapidly fell to 90. The patient became pallid and perspired quite freely. The tube was removed immediately and the blood pressure gradually rose to 124 in four minutes and 144 in nine minutes. The patient's abdomen was distended with gas which made the application quite painful and caused some difficulty in shutting off the femoral pulse. There were no unpleasant complications following the use of the tube.

CASE 3. M. W. Age 20. Primipara. Confined April 15, 1910. A normal labor. Urinalysis on April 17th showed nothing abnormal. Maximum temperature during puerperium occurred on the fourth day and reached 101.4°. Date of observation was April 24, 1910. Fundus 7 cm. above the pubes. Cardiac dullness extended from the midsternal line to the third rib above and to the nipple line. The impulse was felt in the fourth interspace inside of the nipple line. The tones were clear. The second aortic was accentuated. Before the application of the tube, the pulse was 86, the respirations 20, and the blood pressure 114–116. The application of the tube caused very little discomfort and was continued for two and one quarter minutes. The pulse was 96 and the respirations were 26, short with an occasional long breath. After the removal, the pulse was 94, the respirations 18, and the blood pressure 116. The patient had no unpleasant complications following the use of the tube.

CASE 4. C. L. Age 20. Primipara. Confined April 22, 1910. The patient was admitted to the

hospital on April 27th. The date of observation was April 28th. The fundus was 14 cm. above the pubes. The cardiac dullness extended from the right sternal border to the third rib above and to a point inside of the nipple line. The impulse was felt in the fourth interspace inside of the nipple line. The tones were clear. Before the application of the tube the pulse was 84, the respirations 18, and the blood pressure 122. The maximum temperature preceding the observation was 99.5°. During the application, which lasted three minutes, the pulse rose immediately to 110 and the rate increased to 120. The respirations were 22. The blood pressure rose to 120 in the first minute, dropping to 98 in the second minute and to 100 in the third minute. After the removal of the tube the pulse was 72 and the respirations 18. The blood pressure rose rapidly to 122 within the first minute and to 128 in the third minute. The "Momburg Tube" caused considerable discomfort and some nausea but no vomiting. The nausea disappeared soon after the removal of the tube. The lochial discharge was much more profuse after the use of the tube. On April 30th the patient had a slight chill and complained of some pain and tenderness in the right side of the abdomen, mostly in the hypogastric region where there was some tenderness. The temperature rose to 105.2°, the pulse was 132 and the respirations were 28. On May 1st the maximum temperature was 104.6°, the pulse 128, and the respirations 26. A catheterized specimen of urine showed a trace of albumin and pus. There was a leucocytosis of 23,200. On the 2d of May there was some tenderness and rigidity in the right iliac region. There was no palpable mass and there was no tenderness over the femoral artery. The patient ran an intermittent temperature until May 10th after which date it continued normal with one exception. On June 4th a cystoscopic examination was made and the right ureter catheterized. The urine from this kidney showed some pus and a few red blood cells. The patient felt very well but had some pain over the right kidney.

CASE 5. A. S. Age 28. Multipara II. Confined April 24, 1910. The patient entered the hospital 24 hours after normal labor. The patient had an afebrile puerperium. Urinalysis on the 26th of April showed nothing abnormal. The date of observation was April 28, 1910. The fundus was 13 cm. above the pubes. The cardiac dullness extended from the mid-sternal line to the third rib above and to a point inside of the nipple line. The impulse was in the fifth interspace within the nipple line. The tones were clear. Before the application of the tube the pulse was 86, the respirations 20, and the blood pressure 146. During the application, which lasted five and one-third minutes, the pulse rose from 98 to 104. The respirations were 22, while the blood pressure rose to 154 in the first minute and gradually fell to 138 at about the fifth minute. After the removal of the tube, the pulse rate decreased to 92 and then to 84. The respirations were 22, the blood pressure fell to 130 and rose to 136 in the first minute and to 146 in the third minute. There was discomfort from both the blood pressure apparatus and the "Momburg Tube," the former being more uncomfortable. There were no unpleasant after effects in this case.

CASE 6. S. B. Age 17. Primipara. Delivered on April 21, 1910, after a normal labor. The patient had practically an afebrile puerperium. The urinalysis on the 23d of April showed nothing abnormal. The date of observation was April 28, 1910. The fundus was eleven cm. above the pubes. Cardiac dullness extended from the left sternal border to the third rib above and to a point inside the nipple line. The impulse was in the fourth interspace inside of the nipple line. The tones were clear with an accentuated second sound. Before the application of the tube, the pulse was 86, the respirations 20, and the blood pressure 128. During the application, which lasted a little over six minutes, the pulse varied from 72 to 78. The respirations were 26 and the blood pressure rose gradually to 166. After the removal of the tube the pulse rose to 92 and decreased to 74 at the end of the third minute. The respirations were 20. The blood pressure fell to 110, rose to 122 in the second minute, to 124 in the third minute, and 128 early in the fifth minute. The patient said that the tube hurt worse than the blood pressure apparatus. She complained not so much of pain as of tightness. During the application of the tube the lower extremities were blanched as is usual when the tube is properly applied. Immediately following the removal of the tube the site of its application formed a dividing line between the white skin above and red below (vaso dilation). This flushing of the skin disappeared in two or three minutes. There was some soreness in the loins following the application of the tube in this case, otherwise there were no unpleasant after effects.

CASE 7. J. H. Age 21. Primipara. Delivered of a six months' baby on May 3, 1910. The urinalysis on May 4th showed nothing abnormal. The patient had an afebrile puerperium. Date of observation was May 15, 1910. The fundus was not palpable above the pubes. The cardiac dullness extended from the left sternal border to the third rib above to a point inside of the nipple line. The impulse was in the fifth interspace inside of the nipple line. There was a slight impurity at the apex with the first tone. Before the application of the tube, the patient was very nervous. The pulse varied from 88 to 102. The respirations were 20 and the blood pressure 144. During the application, which lasted four minutes, the pulse varied from 116 to 122, the respirations were 28, and the blood pressure rose to 148 and then fell rapidly to 111. After removal of the tube the pulse decreased to 98 in three minutes. The respirations were 22 and the blood pressure rose to 140 within two minutes. While the tube was applied the patient felt like going to sleep. This sensation began in the hands and feet. There was some discomfort but no pain from the application. Immediately after the removal of

the tube she complained of severe pain in the back, extending up to her head. She also had some headache. These symptoms disappeared in about five minutes. There was a very slight vaso dilation near and below the site of application after removal of the tube. There were no unpleasant after effects.

CASE 8. C. B. Age 28. Primipara. Confined May 18, 1910. The labor was normal. Urinalysis on May 18th showed nothing abnormal. The patient had practically an afebrile puerperium. Date of observation was June 3, 1910. The fundus was palpable seven cm. above the pubes. The cardiac dullness extended from the left sternal border, to the third rib above to a point inside of the nipple line. There was a slight presystolic murmur over the third interspace close to the sternum. Before the application of the tube, the pulse decreased from 120 to 98, the respirations were 24 and the blood pressure, was 124. During the application, which lasted five and one-half minutes, the pulse decreased from 136 in the first minute to 128. The respirations were from 24 to 20. The blood pressure was 100 in the first minute and afterwards continued at 110. After removal the pulse decreased from 120 in the first minute to 88. The respirations were 24 while the blood pressure rose to 120 in the first minute. The pain from the application was very slight. The lower limbs were pallid during the application. There was no marked vaso dilation following the removal of the tube, though the skin flushed slightly between the site of application and the pubes. There was no nausea. There were no unpleasant after effects.

CASE 9. A. J. Age 24. Primipara. Delivered on May 30, 1910, by forceps operation. Urinalysis on May 31st showed nothing abnormal. The patient had an afebrile puerperium. Date of observation was June 5, 1910. The fundus was 12½ cm. above the pubes. The cardiac dullness extended from the left sternal border to the third rib above and to a point inside of the mammillary line. The impulse was palpable and was located in the fifth interspace inside the nipple line. There was a faint systolic murmur over the mitral area. It was not transmitted. The second pulmonic sound was accentuated. The abdominal walls were thin. She was slightly anæmic in appearance. Before the application of the tube the temperature was 99.2°, the pulse 96, the respirations 24, and the blood pressure 120. During the application of the tube, which lasted seven minutes, the temperature was 98.6°, the pulse rose to 104 and then decreased to 80. The respirations were 28. The blood pressure rose gradually from 120 to 140. After the removal of the tube the temperature was 99° at the end of the eighth minute, the pulse rose in the first minute to 120 and then gradually fell to 80 in the seventh minute, the respirations dropped to 20 and continued at 20 or 24.

The blood pressure fell to 96 in the first minute, rose to 110 in the second minute, and reached 120 in the fifth continuing at 118 or 120. Three wraps of the tube were necessary to shut off the femoral pulse. The legs were pallid during the application of the tube. Immediately after its removal, flushing of the skin began at the site of constriction and extended downward. There was some pain but the patient complained mostly of the feeling of constriction. Her legs felt asleep. There was some sweating of her face. There were no unpleasant after effects.

CASE 10. A. N. Age 20. Primipara. The patient entered the hospital on the third day after a normal confinement on June 1, 1911. The patient had an afebrile puerperium. The urinalyses on June 5th and 13th showed nothing abnormal. The date of observation was June 28th. The fundus was not palpable above the pubes. The abdominal walls were fairly firm and of moderate thickness. She was not anæmic. The cardiac dullness extended from the left sternal border to the third rib above and to a point inside of the nipple line. The impulse was in the fifth interspace. The tones were clear. Before the application of the tube the temperature was 98.6°, the pulse 88, the respirations 20, and the blood pressure 126. During the application, which lasted three minutes, the temperature was 99°, the pulse rose from 88 to 92, the respirations were 16, and the blood pressure rose from 126 to 144 in the third minute. After removal the temperature was 98.8°, the pulse 72, the respirations 18, and the blood pressure 120 and 122. The tube caused no pain but she felt weak and faint. There was slight sweating. The lower extremities were pallid while the tube was applied. After the removal there was a flushing of the skin which extended from the site of constriction downwards. There were no unpleasant after effects.

CASE 11. J. M. Age 21. Primipara. Normal labor on January 16, 1911. The maximum temperature in the puerperium was 101.6°. The urinalysis on January 2d showed nothing abnormal. The date of observation was February 12, 1911. The fundus was not palpable above the pubes. The abdominal walls were three to four cm. thick. The general condition was good. The cardiac dullness extended from the left sternal border to the third rib above and to a point inside of the mammillary line. The impulse was in the fifth interspace inside of the nipple line. The tones were clear. Before constriction was applied, the pulse was 88, the respirations were 20, and the blood pressure 124. During the application, which lasted six minutes, the pulse rose from 92 in the first minute to 120 in the fourth minute and 116 in the fifth minute. The respirations increased from 20 in the first minute to 24 in the fifth minute. The blood pressure was 130 in the first minute and 136 in the fifth minute. After removal of the tube the pulse dropped to 88 in the first minute and continued at that rate. The respirations were 20 immediately after removal. The blood pressure dropped to 92 and rose to 116 in the first minute. In the second minute it was 120 to 124 at which height it continued. During the time of application there was no sweating. The lower ex-

tremities and the face were flushed. The breathing was rather irregular. The patient complained of very little pain but more of the sense of constriction. There was no vaso dilation following the removal of the tube. There were no unpleasant after effects.

CASE 12. H. G. Age 20. Primipara. Normal labor on February 17, 1911. Urinalyses previous to delivery showed the presence of some albumin and pus but no casts. The date of observation was on February 19, 1911. On the day preceding the patient had a temperature of 100.2° and a pulse of 104. The day following the temperature rose to 102.8° with a pulse of 128. Following this, the patient ran an irregular temperature until March 4th with symptoms of uterine infection. Her ultimate recovery was good. On the date of observation the fundus was at the height of the navel. The abdominal walls were about three cm. thick. The cardiac dullness extended from the left sternal border to the third rib above and to a point inside of the mammillary line. Impulse in fifth interspace within nipple line. The tones were clear. The general condition was good and she did not appear anæmic. Before the constriction was applied, her pulse varied from 86 to 104. Her temperature was 99°, respirations 27 to 30 and the blood pressure 125. During the application, which lasted five minutes, the pulse rose from 116 in the first minute to 160 in the second minute, the respirations increased to 54 in the first minute and were 40 in the third minute. The blood pressure rose to 175 in the first and fell to 154 in the fourth minute. The maximum temperature during the application was 99.2°. After the removal of the tube the temperature was 99°, the pulse fell to 135 and reached its normal rate of 90 in the tenth minute and the number of respirations decreased to 28 at the end of the tenth minute. The blood pressure fell to 100 and rose immediately to 126 continuing at about that height. It was necessary to use three wraps of the tube in order to shut off the femoral pulse. There was considerable discomfort from the application of the tube. There was no sweating during the application. The respirations were of a panting character. The lower extremities were pallid. There was no vaso dilation following the removal of the tube.

CASE 13. C. B. Age 21. Primipara. Normal labor on February 22, 1911. The urinalysis on February 24th showed nothing abnormal. The puerperium was afebrile. The date of observation was March 5th. The fundus was not palpable above the pubes. The abdominal walls were about three cm. thick. Her general condition was good. She was not anæmic. The cardiac dullness extended from the left sternal border to the third rib above and to a point inside the mammillary line. The impulse was in the fourth interspace within the nipple line. The tones were clear. Before the constriction was used the temperature was 99°, the pulse 66, the respirations 20, and the blood pressure 106. During the application of the tube, which lasted about seven minutes, the maximum temperature was 99.3°. The pulse rose to 92 in the first minute, to 120 in the second minute and decreased to 72 in the fifth minute. The respirations were 48 during the first minute and 32 in the fifth minute. The blood pressure rose to 130 in the first minute and continued about that height reaching 135 in the sixth minute. After removal of the tube, the temperature was 99° in the first three minutes and 99.2° in the following four minutes. The pulse increased to 112 in the first minute and then decreased gradually to 58 in the sixth minute. The respirations were 30 in the first minute and 24 after the fifth minute. The blood pressure fell to 70 and rose to 92 in the first minute, to 102 in the second minute and continued at 104 to 106 mm. The lower extremities were pallid, the face was flushed and there was some sweating. There was no anæmia or headache. After the removal she felt well. There was some flushing of the skin extending from the site of application down the legs, this lasted for three minutes. There were no unpleasant after effects.

CASE 14. L. J. Age 23. Primipara. Normal labor on February 16, 1911. Urinalyses showed nothing abnormal. There was a transient rise in temperature during the puerperium which was otherwise uneventful. The date of observation was March 5, 1911. Her general condition was good. There was no anæmia. The fundus was not palpable above the pubes. The abdominal walls were about three cm. thick. The cardiac dullness extended from the left sternal border to the third rib above and to a point inside of the mammillary line. The impulse was in the fifth interspace within the nipple line. The tones were clear. Before the tube was applied, the temperature was 99.4°, the pulse 64, the respirations 18, and the blood pressure 110. During the application, which lasted seven minutes, the maximum temperature was 99.6°. The pulse reached 84 in the first minute and decreased to 58 in the fifth minute. The respirations were 24 in the first minute and became 52 in the fourth minute. The blood pressure rose to 128 in the first minute and fell gradually to 122 in the sixth minute. After removal the temperature was 99° during the first three minutes and was subsequently 99.6°. The pulse rose to 96 in the first minute and decreased to 68 in the fifth minute. The respirations were 28 during the first minute and 16 or 18 afterwards. The blood pressure fell immediately to 90, rose gradually to 124 in the fourth minute and fell to 110 in the eighth minute. During the application of the tube the patient felt faint and slightly nauseated. Her lower extremities were pallid and her face flushed. The pain was not severe. Discomfort was mostly from a sense of constriction. After removal nausea ceased. She felt a trifle chilly and had some throbbing headache. A flushing of the skin which persisted several minutes extended from the site of application downwards. There were no unpleasant after effects.

CASE 15. M. H. Age 22. Multipara II. Normal labor on March 19, 1911. Urinalysis on March

22d showed nothing abnormal. The puerperium was afebrile. The date of observation was March 26, 1911. Her general condition was good. She was not anæmic. The fundus was 10 cm. above the pubes. The abdominal wall was about three cm. thick. The cardiac dullness extended from the left sternal border to the third rib above and to a point inside of the mammillary line. The impulse was in the fifth interspace within the nipple line. The tones were clear. Before the tube was applied the temperature was 98.6°, the pulse 70, the respirations 20, and the blood pressure 116 to 118. During the application, which lasted seven minutes, the maximum temperature was 99.2°. The pulse reached 116 in the first minute, was 88 in the second minute and decreased to 64 in the sixth minute. The respirations were 21 in the first minute, 24 in the second minute, and 18 in the sixth minute. The blood pressure rose to 158 in the first minute and gradually increased to 184 in the fifth minute. After removal of the tube the maximum temperature during the first six minutes was 99.4°. It became normal later in the day. The pulse was 104 in the first minute, 80 in the second minute and 56 in the sixth minute. The respirations were 18 in the first minute and 16 in the sixth minute. The blood pressure fell to 110 and rose to 122 in the first minute. It was 116 in the second minute and continued at about that level. The tube caused very little pain but more discomfort from the feeling of constriction. The legs were pallid but there was no sweating while the tube was applied. After removal there was a moderate vaso dilation extending from the site of application downward. There were no unpleasant after effects.

Case 16. H. S. Age 19. Primipara. Normal labor on March 16, 1911. The urinalysis on March 18th showed nothing abnormal. She had a transient rise of temperature on the third and fourth day of puerperium. The date of observation was March 21st. Her general condition was good though she was somewhat pale. The fundus was not palpable above the pubes. The abdominal wall was about two cm. thick. The cardiac dullness extended from the left sternal border to the third rib above and to a point within the mammillary line. The impulse was in the fifth interspace within the nipple line. The tones were clear with a slight accentuation of the second pulmonic sound. Before the application of the tube the temperature was 97.8°, the pulse 84 to 88, the respirations 26, and the blood pressure 116. During the application, which lasted eight minutes, the maximum temperature was 98.6°. The pulse rose to 100 in the first minute, 120 in the fifth minute and 116 in the eighth minute. The respirations were 24 in the first minute and 30 in the eighth minute. The blood pressure fell to 102 in the first minute and gradually rose to 156 in the seventh minute. After the removal of the tube the temperature was 98.4° in the first four minutes, and 98° in the following four minutes. The pulse rose to 128 in the first minute, decreased to 80 in the sixth minute and was 92 in the eighth minute. The respirations varied from 24 to 28 during the eight minutes following the removal of the tube. The blood pressure fell to 114 in the first minute, rose to 124 in the second minute and to 136 in the third minute. It then fell gradually to 118 in the seventh minute. The patient complained of very little discomfort. She had no headache or sweating. The lower limbs were pallid while the tube was applied. After the removal there was a transient vaso dilation in the skin of the lower limbs. There were no unpleasant after effects.

Case 17. W. C. Age 25. Primipara. Normal labor on April 26, 1911. The puerperium was afebrile. The date of observation was April 30th. The general condition was good. She was not pale. The fundus was four cm. above the pubes. The abdominal wall was about two cm. thick. The cardiac dullness extended from the left sternal border to a point within the mammillary line. The impulse was in the fourth interspace of the nipple line. The tones were clear. Before the application of the constriction the temperature was 98°, the pulse 72, the respirations 24, and the blood pressure 120. During the application, which lasted six minutes, the maximum temperature was 98.6°, the pulse 112 in the first minute, 132 in the fifth minute and 112 in the sixth minute. The respirations were 24 or 22 during the entire time. The blood pressure rose in the first minute to 164, to 166 in the second minute and fell to 162 in the fifth minute. After the removal of the tube the temperature was 99.4° in the first two minutes and 99.2° during the following six minutes. The pulse decreased to 88 in the first minute and to 72 in the second minute. The respirations were 20 in the first minute, 16 in the second minute and 22 in the eighth minute. The blood pressure was 150 in the first minute, 120 in the second minute and 120 in the third minute. There was some discomfort from the constriction but very little pain. There was no nausea but she felt weak. There was a slight sweating of the face. The lower limbs were slightly cyanotic at first but later became pallid. There was no vaso dilation in the skin of the lower extremities after the removal of the tube. There were no unpleasant after effects.

Case 18. P. S. Age 34. Multipara VII. Normal labor on April 21, 1911. The puerperium was afebrile. The date of observation was on May 3, 1911. The general condition was good. There was no anæmia. The fundus was two cm. above the pubes. There was some diastasis of the recti muscles. The abdominal wall was thin. The cardiac dullness extended from the left sternal border to the third rib above and to a point inside of the nipple line. The impulse was in the fifth interspace within the mammillary line. There was some impurity of the first tone at the apex. The second tone was not accentuated. Before the application of the constriction the temperature was 98.4°, the pulse was 64, the respirations 20, and the blood pressure 110. During the application of the tube, which lasted seven minutes, the maximum temperature was 98° (the patient

Case	Pulse					Respirations					Temperature				Blood Pressure				
	Before	During		After		Before	During		After		Before	During	After		Before	During		After	
		Maximum	Minimum	Maximum	Minimum		Maximum	Minimum	Maximum	Minimum		Maximum	Maximum	Minimum		Maximum	Minimum	Maximum	Minimum
1	94	97	97	88	88	20	22	22	16	16	....	....	....	....	116–118	132	122	118	112
2	104	103	103	106	106	17	18	18	16	16	....	....	....	....	144	148	90	144	124
3	86	96	96	94	94	20	26	26	18	18	....	....	....	....	114–116	114	114	116	116
4	84	120	110	72	72	18	22	22	18	18	....	....	....	....	122	126	98	128	118
5	86	104	98	92	84	20	22	22	22	22	....	....	....	....	146	154	138	146	130
6	86	78	72	92	74	20	26	26	20	20	....	....	....	....	128	166	138	128	110
7	88–102	122	116	98	98	20	28	28	22	22	....	....	....	....	144	148	111	140	140
8	98–120	136	120	96	88	24	24	20	24	24	....	....	....	....	124	110	100	124	110
9	96	104	80	120	80	24	28	28	24	20	99.2	98.6	99	99	120	140	120	120	96
10	88	92	88	72	72	20	16	16	18	18	98.6	99	98.8	98.8	126	144	126	122	120
11	84	120	92	88	84	20	23	20	20	20	....	....	....	....	124	136	130	126	92
12	86–104	160	116	135	90	27–30	54	40	32	28	99	99.2	99	99	125	175	154	128	100
13	66	120	72	112	56	20	48	30	30	22	99	99.3	99.2	99.1	106	136	128	106	70
14	64	84	58	96	60	18	52	24	28	16	99.4	99.6	99.6	99.6	110	128	122	124	90
15	70	116	64	104	56	20	24	18	18	16	98.6	99.2	99.4	99.4	116–118	184	158	122	110
16	84–88	120	100	128	80	26	36	24	28	24	97.8	98.6	98.4	98	118	156	102	136	114
17	72	132	110	88	64	24	24	22	22	16	98.8	98.6	99.4	99.2	120	166	160	150	120
18	64	112	96	88	64	20	40	28	28	24	98.4	98	98.7	98.7	110	120	114	124	116
19	80	96	68	?	?	24	30	20	?	?	98.2	98.8	?	?	110	116	108	?	?
20	76	104	76	100	64	24	40	26	30	22	98.7	98.8	98.8	98.8	107	115	104	?	?
21	98	132	114	88	72	22	36	24	24	18	99.2	99.8	99.6	99.4	136	182	157	128	116
22	70	92	84	84	60	18	26	22	26	18	98.6	98.8	98.5	98.4	110–112	126	115	114	110
23	82	92	84	84	72	20	26	20	20	16	97.2	98.6	98.6	98.4	138–140	166	156	132	124

breathed with her mouth open most of the time). The pulse rose to 112 in the first minute but during the remaining time it was about 100. The respirations rose to 28 in the first minute, increased to 40 in the fifth minute and 32 in the seventh minute. The blood pressure rose to 116 in the first minute and increased to 120 in the seventh minute. After removal of the tube the temperature was 98.7°, the pulse decreased to 88 in the first minute and to 64 in the fourth minute, the respirations were 28 in the first minute and 24 in the fourth minute while the blood pressure was 122 to 124 in the first minute and fell to 116 in the fourth minute. During the application of the tube the respirations were irregular. It was difficult to keep the femoral pulse shut off and the lower extremities were somewhat cyanotic. There was some discomfort from the application. There was some sweating. The lower extremities became pink immediately after the removal of the tube. There were no unpleasant after effects.

Cases 19 and 20. J. J. Age 32. Primipara. Normal labor April 27, 1911. The puerperium was afebrile. The date of observation was May 7, 1911. Two later incomplete observations were made on this case. The observations were incomplete because of accidents to the blood pressure apparatus. The patient's general condition was good. She was slightly anæmic. The fundus was not palpable above the pubes. The abdominal wall was about three cm. thick. The cardiac dullness extended from the left sternal border to the third rib above and to a point inside of the mammillary line. The impulse was in the fifth interspace within the nipple line. The tones were clear. Before the use of the constriction the temperature was 98.2°, the pulse 80, the respirations 24, and the blood pressure 110. The duration of the application was eight minutes. In the first minute the pulse was 96, dropped to 80 in the second minute and to 68 in the seventh minute. The maximum temperature was 98.8°. The respirations varied from 20 to 30. The blood pressure was 108 in the first minute and rose to 116 in the fourth when the bulb on the apparatus broke.

The second series of observations was made on the same day with the Riva Rocci apparatus. The temperature was 98.7°, the pulse 76, the respirations 24, and the blood pressure 107. During the application of the tube, which lasted seven minutes, the maximum temperature was 98.8°, the pulse was 104 in the first minute but dropped gradually to 76 in the sixth minute. The respirations were 40 in the first minute and decreased to 26 in the sixth minute. The blood pressure was 104 in the first minute and rose gradually to 115 in the sixth minute. After removal of the constriction the maximum temperature during the first five minutes was 98.8°. The pulse was 100 in the first minute, decreased to 72 in the second minute and to 64 in the sixth minute. The respirations were 30 in the first minute and decreased to 24 in the fifth minute. An error was made in the blood pressure observations during this period. While the tube was applied, the respirations were at first rapid and shallow. The extremities were pallid but slightly mottled. There was no sweating. There was not much variation in the quality of the pulse though it was somewhat fuller after the tube was removed. There was no actual pain from the tube. She complained of a feeling of

oppression and difficulty in breathing. She had some cramps in the calves of her legs. She was subject to them. There was no nausea or headache. There was no vaso dilation following the removal. There were no unpleasant after effects.

CASE 21. M. P. Age 20. Primipara. Normal labor on May 8, 1911. The urinalysis on May 15th showed nothing abnormal. The puerperium was afebrile. The date of observation was May 17th. The general condition was good. There was no anæmia. There was a small goiter, not exophthalmic. The fundus was ten cm. above the pubes. The abdominal wall was about three cm. thick. The cardiac dullness extended from the left sternal border to the third rib above and to a point within the nipple line. The impulse was in the fourth interspace within the mammillary line. The tones were clear. Before the application of the tube, the temperature was 99.2°, the pulse 98, the respirations 22, and the blood pressure 135. During the application, which lasted six minutes, the maximum temperature was 99.8°. The pulse rose to 126 in the first minute and continued approximately at that rate. The respirations were 36 in the first minute, decreased to 24 in the fourth minute and were 30 in the sixth minute. The blood pressure rose to 182 in the first minute and gradually fell to 158 in the fifth minute. After the removal of the tube the temperature was 99.6° during the first eight minutes and 99.4° during the ninth and tenth minutes. The pulse fell to 80 in the first minute and was 72 in the tenth minute. The respirations were 22 in the first minute and 18 in the tenth minute. The blood pressure dropped to 116 in the first minute and was 126 in the tenth minute. There was considerable discomfort from the constriction but no pain. At first there was some nausea and sweating. There was no headache. The face was somewhat flushed. When the tube was applied the lower extremities were somewhat cyanotic. The tube was drawn tighter and the extremities became pallid. There was no vaso dilation following the removal of the tube. Thirty minutes after the tube was removed, the temperature was 99.4° and the pulse 82. On the 21st of May the blood pressure was 138. There were no unpleasant after effects.

CASE 22. M. H. Age 22. Primipara. Normal labor on May 27, 1911. The puerperium was afebrile. The urinalysis showed nothing abnormal. The date of observation was May 31st. The patient's general condition was good though she was slightly pale. The fundus was five cm. above the pubes. The abdominal wall was about two cm. thick. The cardiac dullness extended from the left sternal border to the third rib above to a point within the mammillary line. The impulse was in the fourth interspace inside of the nipple line. The tones were clear. Before the use of the constriction the temperature was 98.6°, the pulse 70, the respirations 18 and the blood pressure 110 to 112. During the application, which lasted five or six minutes, the maximum temperature was 98.7°, the pulse was 84 in the first minute, 92 in the third minute and 88 in the fifth minute. The respirations were 26 in the first minute and 22 in the fifth minute. The blood pressure was 115 in the first minute and increased gradually to 126 in the fifth minute. After removal of the tube the temperature was 98.5° in the first three minutes, 98.4° in the fourth and fifth minutes, the pulse was 84 in the first minute and fell to 70 in the fifth minute. The respirations were 26 in the first minute and fell to 18 in the fifth minute while the blood pressure dropped to 113 in the first minute and was 112 in the fifth minute. The Riva Rocci apparatus was used. There was very little pain from the constriction. There was no headache or nausea. She felt faint when the tube was first removed and there was a slight flushing of the skin below the site of application, but this lasted only a few moments. There were no unpleasant after effects.

CASE 23. E. O. Age 22. (Negress.) Primipara. Normal labor on May 21, 1911. Urinalysis on May 20th showed nothing abnormal. The puerperium was afebrile. The date of observation was May 31st. The patient's general condition was good. She was not anæmic. The fundus was four and one-half cm. above the pubes. The abdominal wall was about three cm. thick. The cardiac dullness extended from the left sternal border to the third rib above and to a point within the mammillary line. The impulse was in the fourth interspace inside of the nipple line. The tones were clear. Before the use of the constriction, the temperature was 97.2°, the pulse was 82, the respirations 20, and the blood pressure 138 to 140. During the application of the tube, which lasted seven minutes, the maximum temperature was 98.6°. The pulse was 88 in the first minute and continued about that rate, the respirations were 24 in the first minute and 20 in the seventh minute while the blood pressure rose to 166 in the first minute and fell with intermittent rises to 156 in the seventh minute. During the first five minutes after the removal, the temperature was 98.4°, during the next three minutes it was 98.6°. The pulse was 84 in the first minute and 82 in the ninth minute. The blood pressure fell to 127 in the first minute, was 132 in the second minute and gradually fell so that it was still 120 after fifty minutes. A Riva Rocci instrument was used. The patient complained more of the feeling of constriction than of pain. During the application of the tube the lower extremities were not cyanosed but were cold. There was no nausea or headache. There were no unpleasant after effects.

LITERATURE

ADAIR, F. L. Northwest Lancet, 1909, xxix, 464.

AMBERGER, J. Beitr. z. klin. Chir., 1910, lxvi, 463.

AXHAUSEN, G. Deutsche med. Wchnschr., 1908, xxxiv, 2114.

AXHAUSEN, G. Deutsche med. Wchnschr., 1909, xxxv, 45.

AXHAUSEN, G. Medizin Klinik, 1909, v, 1632.

BECKMANN, W. St. Petersb. med. Wchnschr., 1909, xxxiv, 601.

BIER. Deutsche med. Wchnschr., 1909, xxxv, 45.
BLECHER. München. med. Wchnschr., 1910, lvii, 1454.
DE BOVIS, R. Semaine med., 1909, xxix, 589.
BURK, W. Beitr. z. klin. Chir., 1910, lxviii, 379.
CARERE, G. Riforma med., 1910, xxvi.
DALGREN, K. Hygiea, Stockholm, 1902, ii, 552.
DUEHRSSEN. Gyn. Rundsch., 1910, iv, 1.
EHRENFEST, HUGO. Interstate Med. Jour., 1911, xviii, 411.
EHRLICH, H. Wein. klin. Wchnschr., 1910, xxiii, 504.
ELLIOTT, F. P. Bristol M. Chir. J., 1907, xxv, 121.
ENGELHORN. Centralbl. f. Gynäk., 1910, xxxiv, 533.
ENGELMANN. Med. Klin., 1909, v, 754.
ENGELMANN. Arch. f. Gynaek., 1910, xc, 148.
FLATAU, S. Berl. klin. Wchnschr., 1909, xlvi, 2039.
FLATAU, S. München. med. Wchnschr., 1910, lvii, 386.
FRANKE, FELIX. Centralbl. f. Chir., 1897, xxiv, 1169.
FRANKE, FELIX. Centralbl. f. Chir., 1908, xxxv, 960.
FRANKL, O. Gyn. Rundsch., 1910, iv, hft. 4.
GELYI, D. Med. Klinik., 1910, vi, 1376.
GERSTER, A. G. Ann. Surg., 1910, li, 878.
GOEBEL. Centralbl. f. Chir., 1909, xxxvi, 1178.
GROSS, G. and BINET, A. Rev. de chir., 1910, xli, 807.
GUÉNIOT, P. Obstétrique, 1911, iv, 56.
HEYMANN, F. Berl. klin. Wchnschr., 1910, xlvii, 1792.
HOEHNE, O. Centralbl. f. Gynäk., 1909, xxxiii, 331.
HOEHNE, O. München. med. Wchnschr., 1910, lvii, 398.
HOFBAUER. Deutsche med. Wchnschr., 1909, xxxv, 45.
HOFSTAETTER, R. Monatschr. f. Geburtsh. u. Gynäk., 1910, xxxii, 470.
ILLMER, W. Gyn. Rundsch., 1910, iv.
VON KAMPTZ. Inaugural Dissertation, Leipzig, 1909.
KEMPFF, F. Deutsche Ztschr. f. Chir., 1909, xcix, 191.
KÖHLER. Deutsche med. Wchnschr., 1909, xxxv, 226.
KRÖNING, B. Deutsche med. Wchnschr., 1909, xxxv, 2007.
KUPFERBERG. München. med. Wchnschr., 1910, lvii, 1309.
KÜTTNER. Berl. klin. Wchnschr., 1909, xlvi, 1632.
LECLERC, G. Lyon Chir., 1909, ii, 371.
LIEPMANN. "Das Geburtshilfliche Seminar," p. 126.
LENZMANN. München. med. Wchnschr., 1909, lvi, 1820.
MATAS, R. J. Am. M. Assn., 1910, lv, 163.
MAYER, A. Prak. Ergeb d. Geb. u. Gynäk, 1909, i, 154.
MAYER, L. J. de Chir., 1910, iv, 121.
MOMBURG. Centralbl. f. Chir., 1908, xxxv, 697.
MOMBURG. Centralbl. f. Chir., 1909, xxxv, 1193.
MOMBURG. Arch. f. klin. Chir., 1909, lxxxix, 1016.
MOMBURG. Verhandl. d. deutsch. Gesellsch. f. Chir., 1909, p. 220.
MOMBURG. Deutsche med. Wchnschr., 1909, xxxv, 2107.
NEUHAUS. Berl. klin. Wchnschr., 1909, xlvi, 918.
PERTHES. München. med. Wchnschr., 1910, lvii, 934.
PEUCKERT. Deutsche med. Wchnschr., 1909, xxxv, 1813.
POPOW, A. München. med. Wchnschr., 1910, lvii, 760.
VON REDING. Cor. Bl. f. schweiz. Aertze., 1910, xl, 1065.
RIBERA Y SANS. Siglo med. Madrid., 1909, lvi, 210.
RIELANDER, A. Centralbl. f. Gynäk., 1909, xxxiii, 981.
RIMANN, H. Deutsche Ztschr. f. Chir., 1908, xciv, 159.
RIMANN, H. and WOLF, W. Deutsche Ztschr. f. Chir., 1909, xcviii, 558.
SHESTOPAL, M. V. J. akush. i. jensk. boliez., 1910, xxiv, 1427.
SIGWART, W. Centralbl. f. Gynäk., 1909, xxx, 233.
SIGWART, W. Arch. f. Gynäk., 1909, lxxxix, 33.
SIGWART, W. Berl. klin. Wchnschr., 1909, xlvi, 1953.
SIGWART, W. Centralbl. f. Gynäk., 1910, xxxiv, 929.
STOLZ, M. Centralbl. f. Gynäk.. 1910, xxxiv, 1324.
STEIGER, A. Ztschr. f. Geb. u. Gyn., 1911, lxviii.
STUCKEY, L. München. med. Wchnschr., 1910, lvii, 760.
TORNAI, J. Deutsche med. Wchnschr., 1910, xxxvi, 1659.
VON D. VELDEN. Ztschr. f. exper. Path. u. Ther., 1911, viii, 483.
VERHOOGEN. J. de Chir. et Ann. de la Soc. Belge de Chir., 1909, No. 1–2.
ZUR VERTH. München. med. Wchnschr., 1910, lvii, 169.
WEBER, F. München. med. Wchnschr., 1910, lvii, 1057.
WEBER, F. Centralbl. f. Gynäk., 1909, xxxiii, 1417.
WILLEMS. Arch. int. de Chir., 1909, iv, 233.

CONSERVATION OF SOUND OVARIES AND TUBES IN HYSTERECTOMIES NEAR THE MENOPAUSE, EXCEPT IN MALIGNANT DISEASE[1]

BY ROBERT L. DICKINSON, M. D., BROOKLYN, NEW YORK
Gynecologist, Brooklyn Hospital; Obstetrician-in-Chief, Methodist Episcopal Hospital

THIS series of hysterectomies has been thought favorable for study because a large number of the patients were intelligent women from private practice with circumstantial after histories.

We have reviewed 200 consecutive histories of individuals operated on more than six months ago. The primary mortality has been 6.5 per cent, chiefly among the cancer cases. Omitting these and five relatively early recurrences of malignant disease, also eighteen women beyond the climacteric at the time of operation, there remain for comparison 164 cases. Full reports at least six months subsequent to operation are to be had in 131 instances, and some of these, of course, cover years. Another group heard from at a briefer interval than six months after operation has a bearing on our opinions but will not be quoted. The arbitrary limit of six months was chosen as it was found from our tables that the disturbances of the surgical

[1] Read at the meeting of the American Gynecological Society, Atlantic City, May, 1911.

menopause occurred within that time. The neurotic tendencies of American women, particularly among teachers, business women, and the well-to-do, are liable to yield a higher average of distresses than figures drawn from foreign peasants, for instance.

Among the cases wherein the ovaries, one or both, or a portion of one or both were conserved, the disturbances of the menopause were avoided in four cases out of every five (79 per cent). The remaining fifth showed nearly or quite as grievous discomforts as if no attempt at salvage had been made, but no one of them showed, as far as these records go, so sudden and stormy a climacteric as two or three whose well developed organs were extirpated during active ovarian life. These failures to postpone for a reasonable time the change of life in this remaining fifth may well have been due to lack of skill or care to preserve the ovarian circulation. I am now trying to follow out Dr. Clark's suggestion in this matter. It has been my practice to leave the ovaries, lightly attached, on top of the cervix or vagina, or either side of the cervix between the peritoneal folds, swung in the four-rope hammock made by the round and broad ligaments — the former cut long for the purpose of lifting the cervical or vaginal stump. Tension or compression is avoided. When the hysterectomy for fibroids is long and difficult, the tubes sound, and the broad ligaments not a varicose mass, the least disturbance is caused to the ovaries by leaving the tubes, though I have not commonly done this. In any case the up-swarming swirls of arteries under the middle of the ovary are not easy to avoid in taking off a tube, and important ganglia or nerve tracks may be cut off. In this sort of fibroids there seems to be a chronic stimulation of ovarian activity or circulation, which the ovary misses when taken away.

Shall the ovaries be removed if the uterus has to come out at or near the time of the menopause? Most operators do this. I feel that all healthy ovaries should remain unless it is a question of malignant disease or infection. No one can say what is the exact term of ovarian activity. It is a matter of speculation whether the women of sixty or seventy (never operated on) in whom the function of a regular or positive orgasm persists have still active ovarian structure, more particularly because one notes, in some of these instances, an absence of any history of the usual upset of nervous equilibrium that goes with the cessation of menstruation. One is, of course, tempted to take away a shrunken nodule of an ovary accompanying a non-menstruating, prolapsed uterus when the patient is fifty years old or over, and absence of these fully atrophied ovaries is not likely to be noticed, but the ovary of the fibroid is a notoriously long lived ovary, and in married women it should be saved. There is no discounting the strength of the feeling against "taking everything out" nor its depressing mental effect.

In our lists, among women between forty-two and fifty-five who were menstruating when the uterus was taken out and ovarian tissue left, twenty-six show fairly full reports. Of these only four suffered a quick and positive surgical menopause, or 1 in 6½ cases. Sexual activity remained stationary in twelve, active in three, and disappeared in none of those reporting. The entries concerning the persistence of sexual desire after the operation are naturally not many on account of the reticent wives and virgins represented in the lists. Even where flushings and depression were complained of no entries of weakened affections are to be found, in cases where ovarian tissue is saved, and nearly two-thirds of the married women seem to feel as before the operation. Some were stimulated, and four disquieting in their demands for a time. Better health would explain this, although the ovarian hypertrophy that follows such operations might also be responsible. As an example of what a bit of ovary can do one of five nymphomaniacs may be cited. My five hysterectomies for this disorder were on aggravated cases, on women of strong enough character to beseech relief at any cost. One early failure may be attributed to the days when I was not radical in removing broad ligament. Three total ablations felt no desire after one to four months and have continued complete cures. Incidentally, one of these is the instance previously mentioned, the

stormiest menopause, ringing all the changes that a nervous system could invent, except melancholia. The second failure was the wife of a man of means, said to be a good, hard-working, domestic lady, quiet in dress and manner, and without alcoholic or other evil habits, only she needed a dozen men a day, and for years had methodically arranged for a supply. Labyrinthine adhesions of extreme density delayed the steps of removing uterus, cervix, tubes, ovaries, and broad ligaments, and when the anæsthetist made me abandon the quarrying in the deep cul-de-sac of this obese patient, it was known that a bit of ovary still clung to a precarious rectal wall. Hearty before, her health improved, and her capacity also. I am credibly informed that her husband is seeking a divorce.

Concerning the ovary of those cases of salpingitis that demand operation, Dr. Pomeroy and I are studying a series of distended tubes to publish later. We believe the acquired resistance of the pelvic peritoneum against the gonococcus and its solvent power is able to do almost incredible things in protection and absorption. But where old pus sacs are hopeless and must come out, the uterus should come too. Ovaries dug up from adhesions, and probably infected, present more troublesome decisions than those pendant to fibroids. Certain instances of chronic stump exudates, painful adhesions, and chronically tender ovaries make me look askance at an ovary that has kept such bad company, unless its owner is fairly young and vigorous and there seems to be no infection of it.

I have not had to reopen an abdomen where the conservative operation was done, so I cannot report specifically on the after appearance of ovaries left after hysterectomy for fibroids.

After these 200 operations, 123 pairs of ovaries remained intact. In the others removal of one ovary, or resection of one or both was done. In general these partial removals show somewhat more trouble than the unimpaired. Only in one thing is there marked difference, and that may be causal: this second group wherein the total of ovarian tissue is not maintained, shows twice as many cases of pronounced and long standing mental depression as the other.

SUMMARY

Conservation of ovarian structure after hysterectomy shows four-fifths of the patients free from the disturbances of the surgical menopause.

The results are somewhat better where both ovaries remain than where one is left or where resections are done.

Where the disturbances do occur their character is less severe and more gradual than after bilateral removal of the ovaries.

In married women conservation shows nearly uniform persistence of sexual desire.

The practice of removing ovaries when taking out a uterus at or near the time of the menopause is to be strongly opposed, except in cases of malignant disease or of definite ovarian infection.

Conservation after operations for incurable tubal infections leaves more tender and troublesome ovaries than after conservation following hysterectomies for fibroids, prolapse, or the hæmorrhages of chronic metritis.

After the removal of the uterus, particularly for large fibroids, whether one or both ovaries remain, ovarian edema or hypertrophy is frequent.

The menopause, i. e., cessation of ovarian function, is likely to occur earlier than the average time in a woman who has lost her uterus.

To preserve the functional activity of the ovary its circulation must not be impaired. Removal of the tube frequently compromises the ovarian blood supply and is a delicate and unnecessary adjustment. Barring diseased and closed tubes, and malignancy and tuberculosis, the tubes should remain. In the forty-one cases in which one or both tubes were left no harm resulted.

The broad ligament is an organ to be respected.

THE EARLY DIAGNOSIS OF INTERMITTENT HYDRONEPHROSIS[1]

With Demonstration of Ureteral Obstruction

By O. S. FOWLER, M. D., Denver, Colorado

I REGRET that the time allotted for this paper does not permit the subject to be considered in the detail which it seems to me it deserves, and of necessity some of the discussion will be abbreviated.

Intermittent hydronephrosis is, perhaps, the most common lesion of the kidney, and yet is recognized in comparatively a very small number of the cases, due we think to the fact that the symptoms found in most or all text-books, are really those of well advanced, or even late hydronephrosis, and too, that many of us are as yet unfamiliar with the great value of the findings of the cystoscope.

It was with much interest, and also admiration for his frankness and honesty, that we recently listened to a paper in the American Surgical Association, by one of the oldest and most respected surgeons of the country, when he related with remarkable candor that he had made all the mistakes and errors possible in the category of kidney lesions, and asserted that we would escape them now, if we but make proper use of the X-ray and cystoscope.

Intermittent hydronephrosis as defined by all writers and text-books that we have ever seen describe accurately all the symptoms of well advanced hydronephrosis, requiring that this back pressure be continued until the kidney and its pelvis will contain quantities of fluid varying from a few ounces to a large fluctuating tumor holding gallons; being entirely silent of the early symptoms, while the kidney is being gradually dilated from normal to about fifty cubic centimeters, the amount required by the Mayo brothers, and we believe, also by nearly all of the surgeons in the country before surgical aid is advised. As I look back, I can recall a number of cases, where we have thought we excluded hydronephrosis for the same reason, which we now very much regret. Many or all of these patients go on without a diagnosis, until they become nervous wrecks from their constantly recurring attacks, and until many of these kidneys have been destroyed to such an extent that only a nephrectomy can be safely done. *It is my idea that a hydronephrosis is present as soon as there is sufficient retention to produce an attack of pain of enough severity to call their attention to the kidney*, and that for the future welfare of the kidney, that a diagnosis should be made at the earliest date possible. *It is our purpose in this paper to attempt to prove that an accurate and absolute diagnosis of intermittent hydronephrosis can be made long before the comparatively large dilation of 50 cc. has been produced by the back pressure, and before any pathological changes have occurred in the kidney by pressure atrophy.* We might as well demand that every appendix reach the stage of general peritonitis, or every ovarian cyst be the size of a gallon measure before we make a diagnosis. In handling this subject, I will for the sake of comparison and emphasis of my point, refer to the stage from normal to 20 or 25 cc. as the early stages, and from 50 to 150 cc. as the advanced stages, and beyond that as total destruction, where all are agreed that a removal of the organ is necessary. I wish further to be distinctly understood that I am not advocating any interference upon floating kidneys, as such, but only to those that are giving symptoms and are demonstrated to have an obstruction in the ureter to the free outflow of the urine.

Etiology. Here I am compelled for time to refer you to a good text, mentioning only that the large majority of cases are due directly to a loose and floating kidney, in connection with an aberrant blood-vessel, to, or from, the lower pole of the kidney, or fibrous, or cicatricial bands in the same region, or around the ureter in its course. Ekehorn

[1] Read before the Colorado State Medical Society, August 16, 1911.

in twenty-five cases, found obstructing blood-vessels in 92 per cent of them. Also, that nearly all of the cases are women, with an average age of 22 years. Attention must be called to the importance of enteroptosis and coloptosis, which must receive their appropriate treatment.

Morphology. These changes are a gradual course of destruction, from a normal kidney and pelvis, to complete destruction of the functions of the organ. I will present for your consideration, a series of 22 cases, all seen since February 1, 1911. Of these, fifteen were diagnosed as intermittent hydronephrosis, and in the other seven, the kidney was excluded, and a diagnosis of chronic or acute appendicitis was made; four of these six appendix cases have been operated with relief of their symptoms. Of the fifteen cases of hydronephrosis, six were on the left side and the remaining nine on the right side, four had had their appendix out without relief, and one other had been so advised, thus making an error of 55 per cent between chronic appendicitis and right-sided hydronephrosis in the series. Braasch reports that 35 per cent of similar cases seen by the Mayos, have had their appendix out without relief. Two were due to stricture of the ureter, and one to pressure of fœtus. Seven have had nephropexy done, including three of those with the appendix removed, all with complete relief to date, though one is still in the hospital. One had had four nephropexies, with recurrences in both kidneys, but in the last operation we were able to take advantage of certain adhesions to the abdominal wall, so that she had secured perhaps, a permanent fixation. This patient had suffered so much from her recurring attacks, that she had become a nervous wreck, and her people finally told that she was insane. She had been getting four grains of opium daily for her nervous condition, so that her trouble now, that of morphinism, is many times worse than her original trouble. This is mentioned to show how often these cases are worried along with, having their symptoms treated with no attempt made to arrive at an accurate diagnosis.

Symptoms. In reviewing the symptoms, we will compare them as found in early and late hydronephrosis, and show wherein they differ. The attack is usually brought on by a severe muscular effort, as lifting, coughing, or sneezing, or by reaching high above their heads, as in hanging a picture, or by prolonged work, such as doing a day's washing. The pain is more or less severe, and located in the kidney region, especially referred to the costo-vertebral angle. It is not referred along the course of the ureter as in stone. It becomes more severe usually with succeeding attacks, which also come more frequently. The pain is practically the same in all stages of the trouble. By palpation you can locate it accurately. There is tenderness in the kidney, and for some time after the attack. The pain is not so severe as in passing a kidney stone, or gall-stones, and there is usually no vomiting, nor is there any real Dietl's crisis. However, we sometimes find a very large hydronephrotic kidney that has never given any pain. The pain may be in the front of the abdomen, if the kidney is markedly prolapsed.

Temperature. There is no temperature in any stage, directly due to this, unless there has been a pyonephrosis implanted upon the hydronephrosis.

Palpation. There is muscular rigidity during the attack in all stages. A tumor which may fluctuate is present in only the advanced stages, and in the early stages there is no tumor, except the kidney itself, which is always tender.

Urinary findings. There is no change in the urine in the early stages, except a few leucocytes from the affected kidney, nor would you expect to find any as the normal function is not yet affected. In the late stages, the retained urine is cloudy, alkaline, of bad odor, of low specific gravity, with pus and bacteria present. There is no blood, unless you include stone cases in this division.

Functional tests. Albarran was the first to show that the function is markedly impaired in all advanced stages; in my series I was unable to demonstrate any impairment.

Cystoscopic findings. There are no changes in the bladder mucosa, except in the late stages there is often found a pouting ureter,

with a sluggish expulsion, or dribbling, of the urine. There is however, no reason why a cystitis might not be present simultaneously.

Differential diagnosis. It will be necessary to differentiate this from acute and chronic appendicitis, stone in the kidney and ureter, gall-stones, certain abdominal tumors. We cannot discuss each separately, but chronic appendicitis is the most difficult one in the early stages, but with the use of the X-ray and cystoscope as described below, there will be little or no trouble in any of them. I will now describe the method used by me in this early diagnosis, the first of which is not original. First, get a careful and complete history of the case, especially in reference to the pain, ask casually whether they would recognize it if they had another attack, explain the need of getting a catheterized specimen from each kidney, to get data for an accurate diagnosis, *be careful not to tell her you will reproduce the pain.* Use the same careful asepsis here as in any other surgical procedure. In catheterizing the ureters note carefully any obstruction to the catheter, and its depth. If you find any difficulty, manipulate the kidney back into its place; after you have collected the urine from each catheter, then have your assistant inject the weak collargol solution slowly, while you watch the ureter for any return flow, until a pain is produced, then ask her whether it is certainly the same pain she had in her previous attacks. I have in several instances, with very nervous women, injected the sound kidney to see if their statements could really be relied upon, and found them correct in all instances, saying at once that that was a wholly different pain and location. Of the fifteen cases in these series, the average amount required to produce pain was fourteen and one-half cubic centimeters, whereas the normal renal pelvis will hold about ten cc., therefore you can readily see that the condition is not at all advanced. The largest amount injected was 25 cc. Some claim that this simply produces a kidney colic, but whatever it is, it certainly is the same pain they suffer while the kidney is being dilated from normal to the advanced stages. Criticism has been offered against this method of basing

Fig. 1. Mrs. J. H., referred by Dr. Russell, Lamar, Colorado. History: Several attacks of pain in region of left kidney and ureter for five months following confinement. There is a constant ache in the same region. Patient lying down, wire stylet in ureteral catheter, cystoscope in bladder, no stones present; all parts normal in position and relation. Urine from both kidneys normal.

a diagnosis upon the patient's statements, and I can readily see that its findings might be incorrect; but we believe that if it is carried on in proper psychological sequence, that it can be relied upon. However, that I might disarm all criticism, I began some months ago to develop a method that would accomplish this end, for I reasoned that if I were right in my previous conclusion then there must be some other method that will demonstrate this beyond a doubt, and if a dropping of the kidney does produce an obstruction in the ureter, can this not also be demonstrated? Radiographs of the kidney and the pelvis have been taken for some time; then why not dislocate the kidney, and get a picture of it

Fig. 2. Same patient as in Fig. 1. Patient lying down. Stylet and cystoscope withdrawn; fifteen per cent collargol solution injected. Renal capacity 18 cc., kidney pelvis in normal position, between first and second lumbar vertebræ. Renal pelvis shows no abnormal condition. Ureter is straight and normal in course, and shows a slight stricture in lower part with slight dilation above it (see arrow).

Fig. 3. Same patient as in Figs. 1 and 2. Patient standing upright. Catheter withdrawn from upper ureter; kidney dislodged from normal position of Figs. 1 and 2. Renal pelvis between second and third lumbar vertebræ; renal capacity 18 cc. Definite kink in ureter, 1½ inches below kidney pelvis. Fifteen per cent collargol injected as catheter was withdrawn. Diagnosis: Intermittent hydronephrosis without pathological dilation of kidney pelvis, or impairment of function.

and the ureter, in this new position? We went about it on the method of renal radiography as proposed by Prof. Voelcker. Following this idea, then I devised a trial plan, which worked so satisfactorily that I have changed it but little. I first show by the above dilation method that the pain is reproduced, I then catheterize them at

Fig. 4. Miss V. G., aged 40, housemaid. Has been operated for chronic appendicitis, again for peptic ulcers, again for obstruction of the bowels, and lastly a complete hysterectomy. Has constant pain in the back, with very severe pains occasionally in region of left kidney; heavy lifting, or hard work as washing at the tub, will bring on these attacks. Frequency of urination while attack is on, and passes more urine than usual after attack ceases. Urine normal. Patient standing; ten per cent collargol injected, catheter withdrawn from upper ureter, kidney has been dislodged, its pelvis being between the third and fourth lumbar vertebræ; its outer border is facing downward, and level with the crest of ilium. Renal capacity 18 cc., slight stricture of ureter in region of broad ligament, kink in ureter three-quarter inch from pelvis (see arrow). Diagnosis: Intermittent hydronephrosis, and slight stricture of lower ureter (presumably from scar tissue in broad ligament following hysterectomy). No pathological dilation of kidney pelvis or impairment of the function.

Fig. 5. Mrs. J. F. M., referred by Dr. R. Hudston, Denver, Colorado, aged 32, housewife. One and a half years ago had a sudden and severe pain in region of left kidney; says it ran down ureter, vomited, and had a cold sweat lasting an hour, was relieved by lying down an hour, was tender for several days after; has had four other attacks since, and these were more severe. Urine normal. Patient standing, cystoscope withdrawn, also catheter; renal capacity 20 cc. Kidney is dislodged, is low down, and drawn toward vertebræ. Kink in ureter about one inch below kidney pelvis, kidney pelvis is dilated just enough to show slightly rounded. Diagnosis: Intermittent hydronephrosis, without pathological dilation of kidney pelvis, and without impairment of the function. Operation proved presence of short aberrant artery to lower pole of the kidney at exact location of kink. Complete relief.

another sitting, and inject into the catheter a strong solution of collargol, just before inserting it into the bladder having plugged up its outer end to prevent leakage. After it has passed to the kidney we take an X-ray; this will show the course of the ureter, and the catheter filled with strong collargol solution will show the same as a stylet the possible presence and location of a stone. For the next plate, I then inject the kidney pelvis while it is now in its normal bed, with the patient lying down; this will show the position of the kidney, and the shape of its pelvis and calyces, which are of much value in showing the presence of tumors jutting into the kidney pelvis. I now withdraw the instrument leaving the catheter still inserted to the kidney; then we have the patient stand up for a plate in this position, and when all is ready, she is instructed to take deep breaths, with forced respiration and inspiration, reaching and stretching the arms upward, dropping upon her heels, and bending from side to side; during this time I inject a strong solution (15 to 25 per cent) of collargol into the kidney pelvis, at the same time drawing

Fig. 6A. Mrs. S. J. W. Normal position. Normal pelvis, 20 cc. capacity. Patient lying down and injected as in Fig. 2. See Fig. 6B.

Fig. 6B. Mrs. S. J. W., referred by Dr. Frank Greedy, Denver, Colorado, aged 44 housewife. Has been operated eight and five years ago for perineal laceration and ovarian cyst. Has had severe pain in left iliac region for six years; came in recurring attacks, with increasing severity, has had so much morphine that she has now its habit. This pain has been called "ovarian trouble," "hysteria," etc.; one doctor refused to see her while "in one of her hysterical attacks." Kidney is not palpable. Weight 220 pounds, urine is normal. Patient standing. Twenty-five per cent collargol injected, renal capacity 14 cc., renal pelvis opposite third lumbar vertebræ, kink in ureter about two and one half inches below pelvis, ureter is enlarged somewhat, but patient is not close to plate. Diagnosis: Intermittent hydronephrosis without pathological dilation, or impairment of the function. Operation: Kidney very much hypertrophied, though normal. Aberrant vein from lower pole of the kidney, as shown in ureter.

the catheter partly out, so that it will not help to keep the ureter from bending, and this will also fill the ureter with the silver solution as it is withdrawn. When the catheter has been sufficiently withdrawn, then we tell her to hold her breath, at that moment taking the picture. We now have radiographs of four different cases, all showing most satisfactorily the exact location of the kink, two of which have been operated. One case had a most beautiful example of an aberrant artery to the lower pole of the kidney, the other an aberrant vein anterior to the ureter, and producing a kink in exactly the same spot as was demonstrated by the X-ray. These are the methods I will follow in the future in these cases, for I believe by them all possibility of error will be eliminated, and I am sure that a positive diagnosis cannot be made by any other method now in use.

TREATMENT

Treatment of this condition is indicated as soon as you make a diagnosis. This will consist of replacing and retaining the kidney near enough to its proper position to relieve the ureter of its obstruction. I have attempted to do this with the aid of binders or corsets properly adjusted, but have succeeded with but one case up to date. The

large majority of these cases will require a nephropexy when the anatomical lesion is demonstrated. Of the seven of this series operated to date, of which three were by Dr. Leonard Freeman, all have been relieved to the present time. In the operation the causative aberrant vessel or band must be found and removed. Those due to stricture of the ureter low down will require gradual dilation with the ureteral conical tipped bougie, up to the size of a No. 9 to 11 chariere. In conclusion I would urge that more care be taken in the differential diagnosis of abdominal conditions. We feel that the greatest need in surgery to-day is conservatism and scientific care in diagnosis, that too many diagnosis are made upon one's surgical experience, instead of actual physical findings in each individual case, and we feel too, that the appendix has been made the goat of abdominal difficulties already in entirely too many instances, and that after its removal without relief we were not frank enough to admit the error and make further search for the cause, but hurriedly assigned the patient to that large class, the "hysterias and neurotics," the rubbish heap for our mistakes, in which we endeavor, unsuccessfully, here as in other lines, to bury our shortcomings. I want to express my appreciation for the courteous reference of cases by Drs. Arneill, Hall, Russell, Bennett, Stephenson, Hudston, Burns, Bagot, Pate, and Steinburg; and more especially to Dr. Geo. Stover, for his scientific interest and great assistance, as the success of the whole procedure has been due to his experience and the remarkable efficiency of his equipment; also especially to Dr. Leonard Freeman, for a number of patients referred for diagnosis, and the privilege of including three cases operated by him, but more especially for his encouragement for research work. To me the subject has been one of the most fascinating interest, being a wonderful pleasure to follow out each additional phase, to what I believe to be the final proof of my statement in the beginning, that intermittent hydronephrosis can be absolutely demonstrated as soon as it appears.

THE ELASTICITY OF THE CRANIUM

By ANGUS McLEAN, M. D., Detroit, Michigan

THE cranium is that part of the skull which constitutes a case for the protection of the brain. It is a hollow osseous globe bilaterally symmetrical, narrower in front than behind. For surgical description it is divided into an upper part called the vault and a lower one called the base. The former includes the arched portion that lies above a plane drawn through the glabella, supraorbital ridges, the occipital protuberance and the superior curved lines of the occipital bone; the latter includes that portion which lies beneath this imaginary plane. In the base are found the three great fossæ — the anterior, middle, and posterior. The vault and posterior part of the base or the part comprising the posterior fossa is composed of flat bones. The anterior two-thirds of the base or the part comprising the anterior and middle fossæ is composed of irregular bones. The part made up of flat bones, is, as we shall see, the most elastic part of the cranium. The portion of the cranial wall formed by flat bones is smooth and convex externally, while internally it is concave and has numerous furrows, shallow depressions and grooves for the reception of the meningeal arteries and the convolutions of the brain. These flat bones are made up of two layers of compact bone with an intervening layer of cancellous bone called the diploe.

The anterior part of the base, that portion formed by irregular bones, has a very uneven thickness, numerous processes, large fissures, and foramina. The superior or internal surface is uneven and for the most part concave.

The center of the middle fossa is slightly elevated, making this surface somewhat convex at this point.

The anterior part of the base is connected with the vault by a more acute angle than is the posterior, consequently, the space inside the cranium, especially the superior-inferior diameter, is less in the anterior part than it is in the posterior.

That the cranium is elastic and compressible has been demonstrated by Brun, Aran, Felitz, Phelps, Hare and others. Any of its diameters can be diminished while others are increased. At its widest diameter, which is 5¾ inches, it can be compressed about one-half inch. At its longest diameter, which is about 7½ inches, it can be compressed about one-fourth of an inch. This amount of compression I have found the average young adult skull can withstand before it fractures, or as Messemere has described it, "before it bursts."

In a series of experiments upon the cadaver when lateral compression was applied (compression just below the parietal eminences), I have found, 1st, that the cranium did not fracture at the points where the pressure was applied but through the middle fossa of the base, 2d, that the lateral diameter would diminish about one-half inch before fracture would occur and 3d, that the fissure usually began at a point midway between the mastoid process and the base of the zygomatic arch, the narrowest part of the cranial base. The fissure or fracture would extend across the base to the opposite side on a line parallel to the force applied. (See figure No. 1.)

When the cranium is compressed laterally as above described, the transverse diameter is lessened, the longitudinal is lengthened and the superior inferior increased in depth and this before fracture takes place. This change in diameters I have been able to demonstrate by compressing the skull (clamps applied low down) until it begins to crack. With the clamp in place the calvarium is now removed. This will immediately spring into its normal shape. Now, by taking impressions of the cut surface of the removed calvarium and of the part of the skull with the clamps attached, it will be seen that the calvarium is shorter and wider than the clamped portion of the cranium. (See figure No. 2.) If instead of severing the calvarium completely only the outer table is carefully cut in two, this outer table will alone resume its normal shape by tearing itself loose from its meager attachments to the inner table. In such a case the outer table will extend laterally about one-fourth inch beyond the lower compressed portions of the cranium.

I was able to demonstrate that the internal, inferior-superior diameter of the cranium is also increased when pressure is applied laterally, by first boring a small hole through the vertex with a gimlet, then passing a steel rod through this opening to the base and thus observing how, with lateral compression, the vertex would bulge upward, apparently allowing the steel rod to sink deeper toward the base.

These same compression experiments I have performed longitudinally, in which case the clamps were placed one over the occiput and the other over the glabellæ. It takes considerable more force to "burst" the cranium when pressure is applied in this manner than when applied laterally. Nor is the elasticity of the cranium as great in this direction as compression could proceed only about one-fourth inch before fracture would take place. Here, too, the line of fracture is always in the base, parallel to the line of force. (See figure No. 3.) Anterior-posterior compression therefore causes a fracture of the base which passes through the ethmoid, sphenoid, dividing the optic foramen, then alongside the body of the sphenoid to the apex of the petrous portion of the temporal bone on to the side of the foramen magnum.

With pressure applied longitudinally the transverse and superior-inferior diameters were increased. (For an outline of the manner in which the transverse diameter is increased see figure No. 4.)

Sharp and sudden blows upon the head cause the various diameters of the cranium to be changed in a similar manner as when slow compression is applied. This I have been able to demonstrate in the following manner. I penetrated the skull through the parietal eminence with a small gimlet and passed a steel rod through this perforation, carrying the distal point against the inner surface of

the opposite parietal eminence. I next fastened a thumb screw with a shoulder to the rod firmly against the external surface at the point of penetration. Over this shoulder on the thumb screw a cake of paraffin was held. I now hit the skull over the opposite point with a heavy wooden mallet. This dented the rod and shoulder into the paraffin to the extent of one-eighth of an inch. The changes in the diameter were also demonstrated by the following method. A hole was bored into the mastoid process one-fourth inch deep and one into the opposite parietal eminence one-eighth of an inch deep. In these depressions the points of a strong pair of calipers were placed. With a wooden mallet a blow was struck near the insertion of the caliper point in the parietal eminence and invariably with each blow the calipers would drop showing that compression at least to the extent of one-eighth of an inch or more must have taken place or the calipers could not have dropped. They could not be reinserted without first loosening the set screw.

Depressions were similarly made and calipers placed in both parietal eminences instead of one parietal eminence and one mastoid process. In this instance the calipers did drop but not as readily. This would go to prove that when the cranium was struck at one point it bulged out at the corresponding opposite point, i. e., when one parietal eminence was depressed the other became more prominent.

Very heavy blows with a blunt instrument produced the same effect as compression to the point of fracture; i. e., the fracture would be in the base of the skull parallel to the direction in which the force was applied.

These fractures of the base of the cranium are rarely produced by direct violence (except in cases where pointed instruments enter through the orbital or nasal cavities). The reason for this is evident when we consider the protection afforded by the face anteriorly and by the strong muscles of the neck posteriorly. The limited amount of elasticity of the base as compared with the vault is therefore the cause for indirect fracture or fractures by "contrecoup" in almost every case. Many different theories have, however, been advanced for the mechanism of the fractures.

The French surgeons of the eighteenth century concluded that it was due to the violence of the blow being transmitted around on opposite sides of the skull until a point was reached where the waves met. The sudden impact of these waves from opposite directions caused the fracture.

Aran and Trelat followed later with the theory that these lesions were due to irradiation, while others claimed that the fissure always started in the vertex and was continued to the base by the shortest route.

Aran was the first to blame the elasticity of the skull for these fractures. The cranium ruptured, he claimed, at a point where the elasticity was least and consequently first overcome. This point is in the unyielding irregular bones of the base.

From the previous description it was seen that this portion of the cranium is narrow, has an uneven irregular surface, and is made up of bones devoid of diploe. It is also very shallow as compared with the full rounded arch-shaped vault and an arched surface will carry more force than a straight or irregular one. For these reasons it is evident that this part of the cranium is weak and only slightly elastic. Consequently, when pressure is applied or a blow is struck it is this portion that first gives way. Of course, the blow must come from some blunt instrument; in other words, it must be diffused, such as happens in falls upon the ground striking upon the head, blows from clubs, sand bags and the like. For, if the violence is limited to a small area, such as from a carpenter's hammer, the bones at the point of contact give way first, resulting in a small circumscribed fracture, usually a depressed one.

Owing to the rapidity with which the separated fragments, in fractures of the base, again spring back into place there is no displacement. Nor is there any tissue in this vicinity that is liable to become caught between the broken ends. Consequently, there is nothing to be done for the lesion in the bone itself.

The question, to what extent has the endocranial contents been damaged in injuries to the skull, is the all important one. Whether the injury is accompanied by a fracture of the

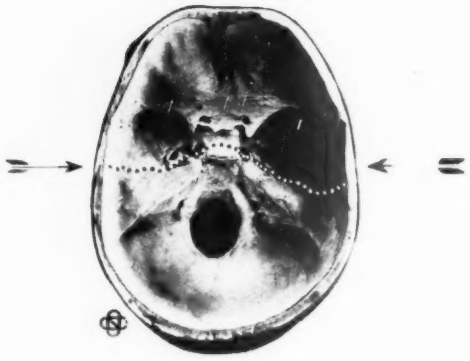


Fig. 1. Line of fracture on lateral compression (arrows show direction of force.)

Fig. 2. (One quarter actual size.) Degree of elasticity on lateral compression.

base or not, is, as far as the damage to the cranial contents is concerned, one of degree only. A fracture of the base simply means that the blow has been great enough to overcome the elasticity of the cranium. When the fracture does take place we know that concussion, contusion, and laceration of the brain has taken place to a greater or lesser degree. Yet when fracture does not occur we may still and usually do have concussion, contusion, and even laceration. The cranial cavity in its natural condition is completely filled and any depression of its walls must encroach upon its contents, i. e., if done suddenly. That not only the diameters of the cranium are changed in blows and compressions of the skull, but that there is a definite diminution in the cavity itself can be demonstrated by passing a canula in the subarachnoid space of the spinal canal and distending it with fluid. Then by making a rubber tube connection to a glass cylinder held in a vertical manner, the fluid will be seen to rise in the cylinder when lateral compression is applied to the cranium. As is well known, the lateral ventricles have a communication with the subarachnoid space through the foramen of Munro, duct of Sylvius and the foramina of Majendi, Key, and Retzius. Of course, when the diminution in the cranial cavity is brought about suddenly the cerebro-spinal fluid cannot be displaced so rapidly and as a result the whole cranial contents takes part in the commotion. Just how much force is necessary to cause simply a concussion, and how much to produce contusions and lacerations and consequent hæmorrhage and edema is difficult to say. However, the changes in the diameters of the cranium and the diminution in the size of its cavity can produce sufficient alterations in the cranial contents to bring about any of these conditions.

The attitude of the head at the time the violence is received must always be taken into consideration in estimating the extent of the injury. When blows are received upon the head while the person is quiet the injury to the intracranial tissues is more local; the cranial wall is simply forced upon its contents. If,

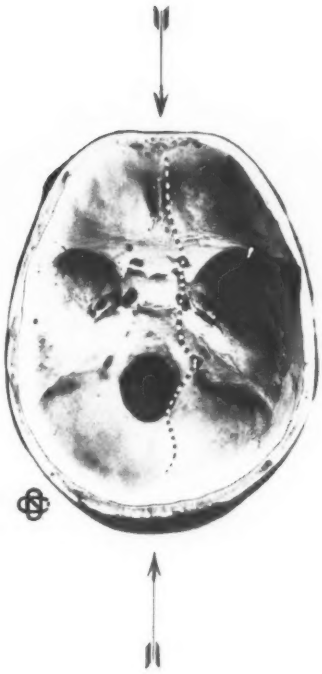


Fig. 3. Line of fracture on antero-posterior compression. (Arrows show direction of force.)

Fig. 4. (One quarter actual size). Degree of elasticity on antero-posterior compression.

however, the injury is received while the head is in motion, as in falling and striking upon the head, the endocranial lesions are more severe, even if the same amount of force is applied; for here the head is in rapid motion and suddenly meets resistance, i. e., the cranial wall and contents come forcibly together. In this case there are in reality two forces at work. This fact must always be borne in mind in estimating the amount of injury sustained in persons falling upon the sidewalk or in being thrown from carriages. Here the accompanying cerebral commotion is greater than when the same amount of force is applied to the head not in motion. In injuries to the skull, the cranial contents, even in cases where fracture does not occur, are encroached upon by reason of its elasticity, and to this elasticity as a cause, the great variety of symptoms that so often follow an injury to the head must be attributed. The sudden diminution of several diameters, the corresponding increase in others and the lessening of the size of the cavity coincidently changes the contents to such an extent that contusion, numerous lacerations, separation of the dura from the bone, rupture of the meningeal and other small arteries, and a tearing of the nerve trunks about the base occur. These, especially if there is much hæmorrhage, in turn cause compression. An exudate may form that will occlude the small foramina leading from the ventricles to the subarachnoid space with the result that an intraventricular pressure is produced which in turn causes an intracranial one. Such pressure in a cavity that normally is completely filled, is easily caused by even slight injuries and this to such a degree that if not relieved by some decompression operation, will cause symptoms that will prove fatal even though no lesion in the bone itself can be discovered.

THE DIAGNOSTIC VALUE OF THE SHADOWGRAPH CATHETER

By LOUIS E. SCHMIDT, M. Sc. and HERMAN L. KRETSCHMER, M. D., Chicago, Illinois

IN several previous communications we have called attention to the value of the shadowgraph ureteral catheter as an aid in determining the topography of the ureter; and also of its value when combined with simultaneous catheterization of the vas deferens, for clinically demonstrating the crossing of the vas deferens and the ureter. In the latter publication we suggested that the shadowgraph catheter, when combined with simultaneous skiagraphy of the vas deferens, might be of value in locating doubtful shadows in the pelvis, perhaps having their origin in the seminal vesicles.

The present paper will consider only pathological cases in which the shadowgraph catheter was used for purposes of diagnosis, demonstrating its clinical value, as well as considering its limitations.

For practical purposes we have divided the pathological cases into three arbitrary groups:

I. Lesions of the kidneys.
II. Lesions of the ureter.
III. Pelvic shadows of extraureteral origin.

I. LESIONS OF THE KIDNEY

The kidney cases which we wish to present have been divided into the following groups:

a. Anomalies of position.
b. Abnormalities of mobility.
c. Changes in the renal pelvis.
d. Renal calculi.

Anomalies of position. A consideration of the anomalies in position of the kidney is best discussed under two headings; namely, congenital and acquired malpositions. A congenitally misplaced kidney is one which has never occupied its normal position and is associated with malformations in the vessels and ureter. An acquired dystopic kidney is one which originally occupied its normal position, but which has become loosened, so that a movable or floating kidney was present for a variable length of time. A movable kidney could then, for one reason or another, become fixed in an abnormal position, so that we would be dealing with an acquired dystopic kidney. The differentiation between a congenital and an acquired dystopic kidney can be made by means of the shadowgraph catheter. This differentiation is based on the fact that in the congenital cases an anomaly of the ureter is always present. In the acquired cases the ureter was originally long enough to permit the kidney to occupy its normal position. Consequently, when such a kidney becomes fixed in an abnormal position its ureter will show abnormalities of its course but not of its length, so that when a shadowgraph catheter is introduced into such a ureter, various windings and deviations in its course are seen in the shadowgram. A congenitally dystopic kidney presents the opposite picture. In this group of cases the ureter is shorter than normal, and being only long enough to reach from the abnormally placed kidney to the bladder, the shadowgraph catheter shows a shorter and more or less direct course of the ureter.

Abnormal positions of the kidney are of clinical importance chiefly from the standpoint of differential diagnosis. Inasmuch as they occur in almost any position in the abdomen, are very rarely, if ever, characterized by a typical symptom complex, and are usually associated with negative urinary findings, it becomes necessary to consider this condition in the differential diagnosis of all abdominal tumors. Just what pathological lesions must be considered in each differential diagnosis will vary in the individual cases.

As an illustration of the value of the shadowgraph catheter in the differential diagnosis of an abdominal tumor, we wish to present the following case:

Case 1. (Fig. 1.) Mrs. S., a very stout woman, giving a history of abdominal pain around the umbilicus, associated with occasional attacks of nausea and vomiting. At times pain could be elicited upon deep pressure over the umbilicus. An indefinite rounded mass, of solid consistency, could be palpated in the median line. In order to exclude a lesion of the kidney, double-sided ureteral catheter-

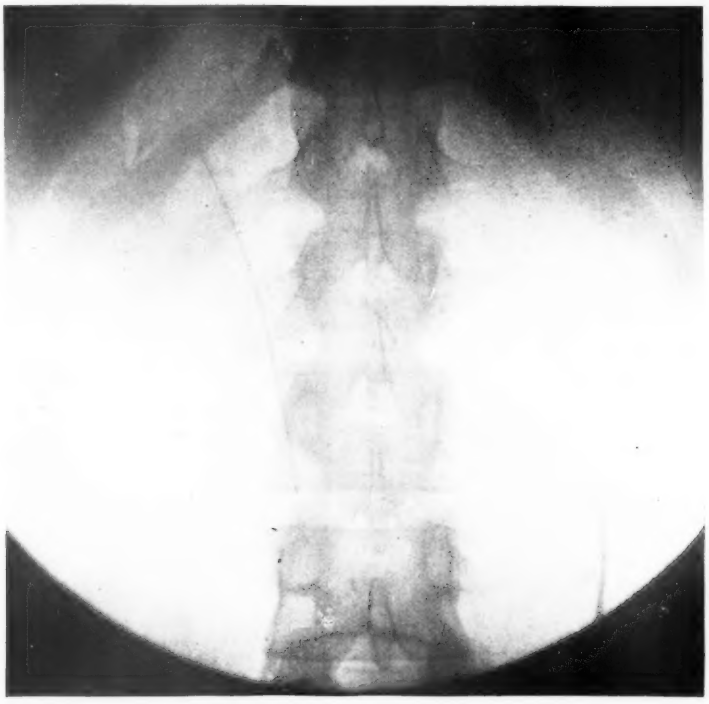


Fig. 1.

ization, with fuse-wire catheters, combined with X-ray, was undertaken. On the right side of the catheter can be seen passing up to the normal position of the kidney, the end of the catheter passing to the upper border of the last rib. On the left side the catheter stops at a point corresponding to the lower border of the third lumbar vertebra. The straight course of the shadowgraph catheter up to its end leads us to believe that we are dealing with a congenital dystopic kidney.

Abnormalities of mobility. Physiologically, the kidney possesses a certain degree of mobility, which corresponds with respiration. In lean patients one is often able to palpate both kidneys easily, especially when the abdominal walls are lax, and if the kidneys possess a little more than their normal degree of mobility. Under these circumstances, such a kidney probably would not be a factor in the differential diagnosis of abdominal tumors. If, on the other hand, a kidney is very movable, and if this mobility is associated with more or less enlargement, it must oftentimes be taken into consideration. The difficulties of differential diagnosis are much increased in very stout persons in whom it may often be impossible to carry out satisfactory palpation.

As illustrations of the value of the shadowgraph catheter in this class of cases, we wish to present the following two cases:

Case 2. Mr. W., age forty years. The patient was a very stout man, and palpation was unsatisfactory. About three or four years ago he had noticed a fullness in the upper right quadrant of the abdomen. This swelling has never given rise to any subjective symptoms, either general or urinary. The tumor has remained stationary in size for the past year, so far as the patient could determine. On examination, a tumor was outlined in the right upper quadrant of the abdomen. It was difficult to determine the exact size and consistency of the tumor because of the thick fat abdominal walls. Here we were dealing with a symptomless tumor in the right upper quadrant of the abdomen, of slow

Fig. 2.

growth, in a patient who was in good general health. The differential diagnosis rested between hydrops of the gall-bladder, Schnürlappen, and a movable kidney. Tumors of the omentum and mesentery, either solid or cystic, were also considered.

It occurred to us that the simplest procedure to carry out would be to exclude the kidney. A shadowgraph catheter was passed without any difficulty and an X-ray picture taken. Then the tumor was displaced by grasping it with the hand and holding it as far to the left of its apparently normal position in the right upper quadrant of the abdomen as possible. Then a second X-ray picture was taken. In the first picture the wire can be seen passing upward, parallel to the spinal column, to the normal position of the kidney. The second picture, made after displacing the tumor, shows the shadowgraph catheter passing upward to the left, crossing the spinal column obliquely, from below upward and outward. It was evident, therefore, that the tumor under consideration was the kidney, and that in displacing it to the left, it pulled the ureter with it, so that the probable diagnosis of movable kidney, made when the patient was first seen, was verified.

Fig. 3.

CASE 3. (Figs. 2 and 3.) Mrs. M., age twenty-eight years. Three years ago, the patient was operated on for appendicitis. For the past fourteen months she has been suffering from diffuse abdominal pain, the pain being without any relation to urination, defecation, or menstruation. The physical examination showed the heart and lungs to be normal. The lower border of the stomach, dilated with seidlitz powders, was two finger breadths below the umbilicus. The left kidney was movable. The right kidney was slightly enlarged and could be freely moved about both up and down, and it could also be completely displaced and held to the left of the median line.

In order to determine positively whether the mass was the kidney or not, a shadowgraph catheter was passed into the kidney and an X-ray taken. In the first picture, the catheter, after traversing the pelvis and passing upward, bends inward toward the median line, then sharply turns upward, forming almost a right angle; it then passes upward parallel with the spine, to terminate in the normal position

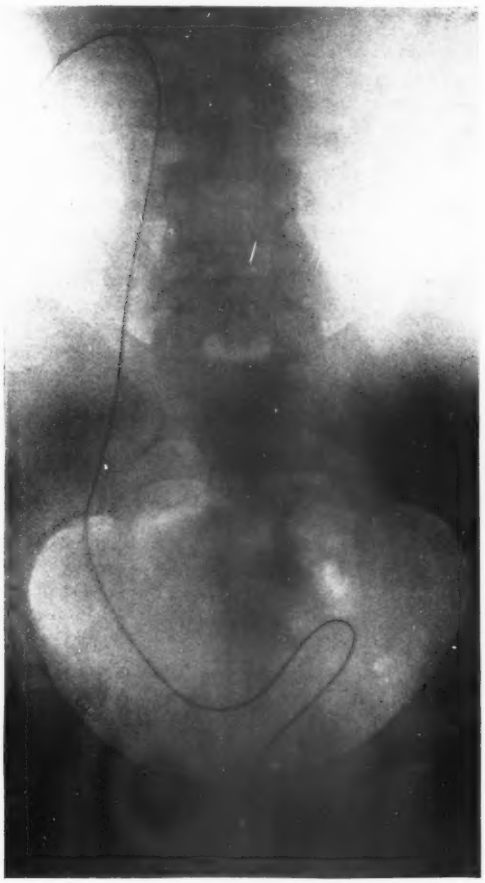


Fig. 4.

of the kidney. In the second picture, made after displacing the tumor, the catheter presents an interesting course. Instead of terminating in the normal position of the kidney, the end of the catheter is seen over the body of the fourth lumbar vertebra. The right angle seen in the first picture has been changed to an obtuse angle; the course of the ureter, instead of being upward on the right side of the spine and parallel to it, crosses the vertebræ, passing upward to the level of the fourth lumbar vertebra, being well to the left of the spine; it then forms a loop, passing finally downward and outward. The diagnosis of movable kidney was, therefore, substantiated.

Changes in the renal pelvis. Although changes in the renal pelvis are probably best

Fig. 5.

shown by injecting into it some of the colloidal silver salts, the shadowgraph catheter can also be used for demonstrating enlarged and otherwise changed pelves. That the colloidal silver salts give far more definite and complete radiographic pictures must be admitted.

CASE 4. (Fig. 4.) Miss T., age twenty-four years. About seven months ago the patient first noticed that her urine was very bloody. The hæmaturia persisted for about eight weeks and was entirely without pain. Since the initial attack, the subsequent hæmaturias have lasted for a few days only. In the intervals between the attacks of hæmaturia the urine was normal, so far as she could tell. Three months after the onset of the last hæmorrhage, she had some vague pain in the back. At present this is more of a dull ache than a real pain. Cystoscopy revealed a normal bladder.

A shadowgraph catheter was passed and an X-ray picture taken (Dr. H. E. Potter). If we follow the course of the catheter upward, we see that it passes slightly inward toward the median line. After reaching the lower border of the transverse process of the second lumbar vertebra, the catheter passes outward and downward to terminate on the level of the transverse process of the third lumbar vertebra.

From the peculiar course taken by the catheter at its upper end, two possibilities can be considered in explaining the pathological condition present: 1. that we are dealing with a dilated pelvis which allows the catheter to take this peculiar course; 2.

Fig. 6.

that we have here a movable kidney which seems to be fixed in its present somewhat low position. This point could have been definitely determined by injecting the pelvis with cargentos and taking momentary exposures, or by measuring the capacity of the pelvis.

Renal calculi. For various reasons, it often becomes necessary to demonstrate beyond any possibility of a doubt that a given shadow on the X-ray plate, occurring in the kidney region, is produced by a stone in the kidney. If the calculus is large, branching and extending up into the calyces, it is quite easy to state positively that the given shadow is of renal origin. It would not be quite so easy if the shadow were small and more or less round or oval. Then two possibilities would arise: 1. The kidney may be absent on this side and the shadow be produced by a calcareous lymph node or any one of several other well known pathological conditions capable of producing shadows in this area; 2. or the stone may be situated in the upper end of the ureter, and inasmuch as the operative interference is quite different, depending upon whether the stone is in the parenchyma or pelvis of the kidney or in the upper end of the ureter, it is desirable to determine this fact if possible before operation. (One of us once saw a normal kidney removed when the stone was in the upper part of the ureter.)

We wish to present the following two cases in which the shadowgraph catheter was used for localizing renal stone:

CASE 5. Mrs. L., age twenty-eight years. The patient's present illness extends over a period of four or five years. The only symptoms of which she complains are eructations of gas and vomiting. The first physician called diagnosed appendicitis and immediately removed the appendix. No relief from the symptoms followed this procedure. She then consulted another physician who also diagnosed appendicitis, and performed a second appendectomy, informing the patient that he removed the balance of the appendix left by the first operator.

The presence of pus in the urine led to a cystoscopic examination and ureteral catheterization, which demonstrated the presence of pus in the urine obtained from the left kidney. The first X-ray picture taken showed an indefinite shadow in the region of the left kidney and it was decided to pass a shadowgraph catheter and take an X-ray picture with the catheter in situ. This shows the shadow behind the last rib, and the catheter stopping a short distance below the stone shadow. A diagnosis of stone in the parenchyma of the kidney was made and verified by operation.

CASE 6. (Fig. 5.) Mr. P. Patient had been suffering from severe attacks of renal colic. He stated that with the subsidence of the pain he voided large amounts of urine. The X-ray showed the presence of a shadow in the kidney region. For purposes of accurate diagnosis a shadowgraph catheter was passed and another X-ray picture taken, which shows the presence of a stone in a dilated pelvis, the wire passing beyond the stone.

II. LESIONS OF THE URETER

The lesions of the ureter which we have considered are:

a. Anomalies of number.
b. Obstruction due to stricture.
c. Stone.

CASE 7. (Fig. 6.) A case of triple ureters. Mr. D. M., age twenty-five years. The patient stated that he has been suffering from chronic urethritis for one year. He was given the usual routine treatment for a reasonable period of time without any appreciable improvement in his condition. For the purpose of excluding a lesion in the bladder, which might be a factor in keeping up his trouble, the patient was cystoscoped. During this cystoscopic examination, two ureteral orifices were found on the right side and one ureteral orifice on the left side. We then decided to pass three shadowgraph catheters, one into each of the three ureteral orifices, at one sitting. This procedure was carried out without the slightest difficulty. The two ureters on the right side were catheterized at once by means of a double direct catheterizing cystoscope, which was then removed, and the left ureter catheterized by means of a single direct catheterizing cystoscope. With the three catheters in situ the patient was exposed to the X-ray.

The left ureter does not present anything special for our consideration at this time. If we follow the courses of the two ureters on the right side, it will be seen that they cross at a point that appears to be just above the brim of the pelvis, so that the inner one, in passing upward, becomes the outer one, and the outer becomes the inner. Above the crossing point we note that the inner catheter passes higher up than does the outer one.

In this particular case, all three ureteral orifices were normal and there was no connection between this congenital anomaly and his chronic urethral trouble.

That one of these three ureters may become infected with gonococci and remain as a focus of reinfection for many years has been shown by Bransford Lewis' case, in which gonococci were isolated from the urine of one ureter in a patient who was the possessor of three ureters.

Fig. 7.

Fig. 8.

This anomaly is seen at rare intervals at the postmortem table, but so far as we know, Lewis', Tilden Brown's and our own are the only ones in which this anomaly was demonstrated in this manner in the living subject.

Obstruction of the ureter due to stricture.

We have also employed the shadowgraph catheter for the purpose of demonstrating an incomplete obstruction of the ureter, probably due to a stricture.

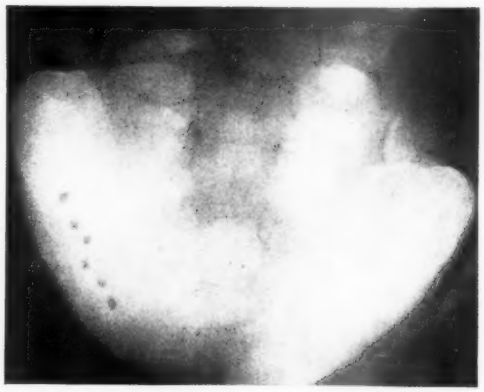


Fig. 9.

CASE 8. (Figs. 7 and 8.) The patient's only symptom was pain in the pelvis, very low on the left side. A No. 6 ureteral catheter was passed into the left ureter, and met an obstruction about one inch above the ureteral orifice. After eight or nine attempts to pass the No. 6 catheter beyond this point were all unsuccessful, a No. 4 catheter, armed with fuse wire, was used. This passed the obstruction without any difficulty. Three subsequent attempts with the No. 4 catheter were successful each time.

We recognize the fact that great care must be exercised in making a diagnosis of ureteral obstruction by the passage of a ureteral catheter. Passing a catheter part way up the ureter and then being unable to pass it any further does not, by any means, justify one in making a diagnosis of ureteral stricture, as many other factors may produce an obstruction to the passage of the catheter, such as spasm of the ureter. But when one meets with an obstruction to a No. 6 catheter each and every time an attempt is made to pass it, and a smaller catheter (No. 4) passes each time, one is then probably justified in concluding that the obstruction is due to a stricture, when stone can be excluded, as was done in this case. Injections of cargentos showed a dilated ureter above the point of obstruction.

CASE 9. Stone of the ureter. Dr. D., age fifty-eight years. The patient states that for the past three or four years he has noticed some dribbling at the end of urination. He was never obliged to void urine at night until about two months ago; since then he urinates once during the night. For the past two months the urine has been bloody. Once during the past summer he voided smoky urine, which upon examination, revealed the presence of blood and pus. The retention was ten cubic centimeters. The rectal examination was negative.

Cystoscopy showed the presence of a mild cystitis. The left ureteral orifice was negative. A small flake of muco-pus was adhering to the right ureteral orifice. An X-ray picture (Dr. H. E. Potter) shows the presence of a shadow opposite the third lumbar vertebra. To determine accurately the position of the stone, a shadowgraph catheter was passed and a second X-ray picture taken, which showed the tip of the catheter stopping at the shadow.

III. PELVIC SHADOWS OF EXTRAURETERAL ORIGIN

The frequency with which various indefinite shadows are found in skiagrams of the bony pelvis is familiar to workers in Roentgenology as well as to those engaged in surgery of the urinary organs. Because of their frequent occurrence, they become factors which must be taken into consideration in the differential diagnosis of ureteral calculi.

On account of the simplicity of the shadowgraph catheter method, as well as its accurate results, it is advisable to determine thereby the exact origin of these shadows before undertaking any operative interference, particularly in those cases in which there is an atypical history of disturbance in the upper urinary

Fig. 10.

tract, either with or without obscure physical findings.

The nature of the bodies which produce these shadows is of minor importance. Various conditions may be present in an individual case, any one or several of which may be capable of producing these shadows. Among the commoner causes we may briefly mention: calcified lymph nodes, phleboliths, atheromatous changes in the blood-vessels, calcified pelvic ligaments, concretions in the prostate or seminal vesicles, fecal concretions, etc. It is of far more clinical importance to determine the location of the shadow-producing body with reference to the ureter than it is to establish its nature. As previously demonstrated, the course of the ureter is quite variable and hence it is impossible to determine the location of the suspected calculus without some definite landmark. This can be done by means of the shadowgraph catheter, so that little if any doubt need exist in regard to the location of the shadow.

As examples of the difficulties encountered in drawing conclusion from a plain skiagram, we have selected the following four cases.

CASE 10. This shows a shadow at the brim of the pelvis just beyond the sacro-iliac synchondrosis. The presence of ureteral stones in this area is quite apt to be overlooked in the skiagram, so that sometimes, although the skiagrapher's report is negative as regards the presence of a stone, a stone is removed from the ureter at the time of operation. A stone's being overlooked in this location can often be explained by the fact that the stone lies on the bone. Knowledge of this fact has lead radiographers to take pictures at different angles by changing the position of the tube or of the patient.

CASE 11. This shows a shadow in the pelvis. It is absolutely impossible, either by its size, shape, or position, to say whether this shadow has an intra- or extraureteral origin.

CASE 12. (Fig. 9.) This shows six or seven shadows near the spine of the ischium. It has been shown that this type of shadows, multiple, and occurring in a row along the spine, have an extraureteral origin. Still, how much more secure one feels after a shadowgraph catheter has been passed, and one can say positively, without any hesitation, that they are not ureteral calculi.

CASE 13. This shows shadows on both sides of the pelvis, on the left side near the ischial spine, and two on the right side between the ischial spine and the symphysis pubes.

In the following three cases the presence of these obscure shadows in the pelvis was proved to have an extraureteral origin by means of the shadowgraph catheter.

CASE 14. (Fig. 10.) Mr. N. C., age forty-three years. The patient stated that for the past year his urine has contained sand. Since this time he has frequency of urination, passing water once every hour during the day and three times during the night. He has difficulty in starting the stream and the act of urination is accompanied with a burning sensation in the urethra which persists after the urinary act is finished. During the past year he has had several attacks of hæmaturia, each lasting for several days. Three days prior to entering the hospital, he had several attacks of abdominal pain, localizing in the region of the left kidney.

The X-ray showed the presence of three pelvic shadows. Several days after this picture was taken the patient passed a very small calculus, which might have corresponded in size to one of the pelvic shadows. It was decided, therefore, to take a second X-ray picture with a shadowgraph catheter in situ. This shows the shadows well outside the ureter, and hence they are not due to ureteral calculi.

CASE 15. Mr. M. K. For several years the patient has been suffering with great frequency of urination, both day and night, often being obliged to urinate twelve to fifteen times during the day and five or six times during the night.

Cystoscopy shows a very marked degree of cystitis in the bas fond, but no stone and no tumor. X-ray examination revealed the presence of shadows in the pelvis well toward the bony wall. Because of the great urgency and frequency of urination, it was thought best to pass a shadowgraph catheter into the ureter and then obtain another X-ray. This shows the catheter passing upward toward the kidney, and outside of it the presence of the shadows are noted some distance from the catheter. It is quite apparent, therefore, that we are dealing with some extraureteral shadow-producing bodies and not with ureteral calculi.

CASE 16. The shadow is quite small and lies well to the outside of the catheter, but not so far away as in the preceding and following pictures. When the shadows lie quite close to the catheter but not in direct contact with it, as sometimes happens, one must always bear in mind the possibility of a stone's being present in a sacculation of the ureter.

In cases 14, 15, and 16, the shadowgraph catheter shows conclusively that we are not dealing with ureteral calculi, but that the shadows seen are of extraureteral origin.

CARBUNCLE OF THE UPPER LIP

With Special Reference to the Prevention of Cavernous Sinus Thrombosis

By W. O. BULLOCK, M. D., Lexington, Kentucky

SURGICAL text-book authors for years treated the subject of carbuncle of the upper lip as a condition of extraordinary malignancy, but from none of them is there to be found a reasonable explanation as to why this is the case, nor do I find any figures on the actual mortality. Pyæmia, septicæmia, sinus thrombosis, meningitis, and exhaustion are given as the causes of death.

Believing that, in many instances, sinus thrombosis and its sequelæ can be avoided, I have undertaken to ascertain from a collection of recent cases the actual mortality and the proportion of fatal cases due to sinus thrombosis. Before considering this, however, I wish to call attention to a most interesting paper on this subject by Rosenbach of Gottingen (Archiv für klin. Chir., bd. 77, p. 715 et seq.) "Concerning Malignant Furuncle of the Face."

This author after briefly mentioning the views of Stromyer (1855–1860), who regarded the condition as a symptom of existing sepsis; Trendelenburg (1886), who considered the malignancy as due to a specific infection; a later assumption, that a mixed infection from the mouth was the cause, then quotes Lenhartz and Lexer, who have shown that such infections are due in most cases to the ordinary furuncle germ, staphylococcus. The theory of increased malignancy of the germ is also mentioned, but, says the author "One cannot assume that in the face there exists a specially virulent staphylococcus, nor are wounds of the face more liable to infection than those elsewhere." So there only remains the assumption that the cocci acquire their virulence while in the facial furnucle.

As the result of his study and investigation Rosenbach evolved the following explanation. The anatomical relations of the muscles of the face to the skin and subcutaneous connective tissue are such, that the action of these muscles continuously forces or pumps the infectious material from the furuncle into the surrounding tissue spaces, whereas in other parts of the body the skin is separated from and uninfluenced by the action of the underlying muscles. This coupled with the further assumption that the cocci in the original furuncle, already pathogenic, forced as above described into fresh tissue spaces, generate, the result is a generation of increased virulence. Accepting this theory as to the mechanical spread of the infection, it is easy to understand that the lips, being the most mobile portion of the face, should suffer most. The question, however, naturally arises, why with almost identical anatomical arrangement present in both upper and lower lip the latter is not more often involved? This I believe is due to the much more vigorous action of the upper lip in both articulation and mastication. According to Rosenbach, the hard ridges which pass up and out from the carbuncle are not thrombosed veins nor are they muscles, as they have been occasionally described. They are the result of the pressing and squeezing the infectious matter into the cellular spaces. I have referred at some length to Rosenbach's paper, because his theory offers a real explanation, which has not, I believe, found its way into English print.

Although the staphylococcus is the usual organism in the production of carbuncle of the lip, "All possible forms of pyogenic bacteria, particularly the streptococcus, may be found. According to Kocher the streptococcus alone may produce this variety of inflammation." (Lexer-Bevan, 1908.)

Let us see now what is the latest and most approved advice as to the treatment: Excision; curettage; incision, crucial, multiple, with and without irrigation; all these singly or combined, with local application of strong antiseptics, poultices, etc. Lexer goes a step farther when he advises proximal ligation and removal of clot, when large veins have become the seat of a septic thrombus.

Case No.	Hospital.	Year.	Age.	Sex.	Duration prior to admission.	Treatment.	Days in Hospital.	Result.	Cause of death.
1	Pennsylvania	1906	26	M.	One week	Crucial incision, pure carbolic	5	R.	
2	Pennsylvania	1907	42	M.	Few days	Incis. in lip; later incis. in cheek	7	D.	No symptoms of meningitis, apparently
3	Pennsylvania	1909	43	M.	9 days	Incis. and flax-seed poultice	4	R.	Septicæmia
4	Pennsylvania	1909	70	M.	2 weeks	Incis. and hot compresses	11	R.	
5*	Pennsylvania	1910	24	F.	5 days	Incis. and drainage	4	D.	Septicæmia
6	German, N. Y.	1908	45	M.		Incision	12	R.	
7	German, N. Y.	1909	23	M.		Incis. and drainage	31	D.	Septicæmia and cavernous thrombosis
8 [1]	Jefferson	1905	28	F.		Operation	1	R.	
9 [2]	Jefferson	1905	19	M.		Operation	8	R.	
10 [3]	Jefferson	1906	53	M.		Excision	7	R.	
11 [4]	Jefferson	1908		M.		Excision V		R.	
12 [4]	Jefferson	1908			Several weeks			D.	Cerebral abscess
13 [5]	Jefferson	1909						R.	
14	Jefferson	1909						R.	
15	Jefferson	1909						R.	
16 [6]	Jefferson	1909						R.	
17	Jefferson	1909						D.	Thrombosis of cavernous sinus
18 [7]	Jefferson	1909	38	M.		(Both lips.) Incision and drain ligation veins of lips	14	R.	
19 [4]	Jefferson	1909				Excision	Several weeks	R.	
20	Boston C. H.	1905	62	M.	7 days	Crucial incision	4 days	R.	
21	Boston C. H.	1905	26	M.	4 days	Curetted	4 days	R.	
22	Boston C. H.	1905	53	M.	5 days	Crucial incision	6 days	R	
23	Boston C. H.	1905	42	M.	4 days	Curetted	5 days	R.	
24	Boston C. H.	1905	15	M.	5 days	Crucial incision	4 days	R.	
25	Boston C. H.	1905	47	F.	4 days	Poultices	4 days	R.	
26	Boston C. H.	1905	30	F.	6 days	Curetted	6 days	D.	No autopsy

* Although in hospital records the cause of death is given as septicæmia, Dr. Gibbon writes, "We had a fatal case at the Pennsylvania Hospital recently in which death occurred probably from sinus thrombosis." (Date of letter November 15, 1910.)
[1] Keen. [2] Hearn. [3] Gibbon. [4] Schwartz. [5] Klapp. [6] Stewart. [7] Stellwagon.

For years writers on this subject have seemed to take pleasure in showing the path taken by the infection in the production of cavernous sinus thrombosis and subsequent meningitis, but no one seems to have thought to block the path. While operating on the case herein reported, ligation and division of the facial veins was carried out as a preventive measure against this complication.

Miss McC., 24 years, white, Lexington, Kentucky, referred by Dr. Carrick. Occupation, telephone girl. Admitted to St. Joseph's hospital July 23, 1910. Family history, negative. Previous history, within past four or five years patient has had as many as twenty attacks of boils located in various parts of the body; slight enlargement of the thyroid; urine, normal. Present symptoms began two weeks before admission as a furuncle of the upper lip, this was lanced several times without result. At this time upper lip is enormously swollen, both cutaneous and mucous surfaces of the lip are studded with small necrotic, purulent foci, most numerous in the right half. Lip projects beyond the tip of the nose. Infection centering at the right angle of the mouth, involves almost the entire face in diffuse cellulitis. Eyelids swollen, closed, and red. Temperature, 103°. Pulse, 130.

Operation, July 23, 1910. Ether. Excision of necrotic areas followed by local application of pure phenol, the facial veins on each side of the nose having first been ligated and divided at a point from

a half to three-quarters of an inch below the inner canthus of each eye. July 24, 1910. Redness and swelling of the lids much improved, lip better, but on July 25, 1910, incisions required in lip, right cheek, and submaxillary triangle of neck on account of suppuration. Following this second incision, the symptoms gradually subsided and patient left hospital August 10, 1910, completely relieved.

Of course, the result in a single case proves nothing positively. However, in the case here reported conditions were ripe for the occurrence of cavernous sinus thrombosis; the facial veins were ligated and divided and thrombosis did not occur; and further, although the lip condition required a second incision, the orbital infection improved rapidly and without interruption.

Let us next see if sinus thrombosis is sufficiently frequent in these cases to justify this additional scarring of the face. Through the kindness of Drs. Gibbon and Stewart of Philadelphia, Dr. Lund of Boston, and Dr. F. D. Bullock of New York, the following data were obtained from the records of the Pennsylvania and the Jefferson Hospitals, the Boston City Hospital, and the German Hospital of New York. In this series of twenty-seven cases, there were six deaths, a mortality of 22 per cent.

In three of the six fatal cases, 5, 7, and 17, there were symptoms of sinus thrombosis, accounting for a mortality of 11 per cent, nor does this include case 12, dying from cerebral abscess, nor of course case 26, in which the cause of death was not stated. The figures here given are sufficient justification of any attempt to improve our results, and this paper was written to advocate the ligation and division or excision of the facial veins in all cases of carbuncle of the upper lip which do not at once clear up after the usual surgical treatment has been instituted, and in all neglected cases where the orbital tissues show signs of infection. In some far advanced cases it may even be advisable to ligate the superior ophthalmic vein.

THE LANE OPERATION FOR CHRONIC CONSTIPATION[1]

With Report of Two Cases

By GEORGE TULLY VAUGHAN, M. D., Washington, D. C.

IT is needless to dwell upon the frequency of constipation or the advisability, for lack of greater knowledge, of treating a symptom as if it were a disease. It is sufficient to say that around this symptom revolves a host of other symptoms, like satellites around the parent orb, whose conjunction or combination produces baleful effects upon the human system.

Constipation means insufficient or inadequate evacuation of the bowels, a failure on the part of the bowels to eliminate the waste material. As to frequency, it is probable that 90 per cent of persons who have reached the age of 20 years have suffered more or less from attacks of constipation. When these attacks become so frequent as to be continuous or when, as sometimes happens, one is born so, we call it chronic constipation. This condition is not near so common as the former. Numerous causes are given. The erect position of man, certain anatomical types congenital or acquired, especially in women, too great loss of fat, tight lacing, and bad habitual positions, all leading to visceroptosis and resulting intestinal obstruction from the formation of kinks or angles in the ileum or colon. No doubt there are many other causes, such as stricture or dilatation of the bowels, conditions affecting their innervation and peristaltic action, or changes in one or more of the digestive fluids.

Mr. Lane gives many symptoms which may result from chronic constipation or chronic intestinal stasis. In the first place the patients are more frequently women, often women who have lost much flesh and strength or who have the anatomical type which predisposes to visceroptosis, pain in the region of the stomach, appendix, or right kidney, caused

[1] Read before the Medical Society of the District of Columbia, Oct. 4, 1911

by traction of the prolapsed or distended organs, flatulence, and indigestion. Lane believes that cystic disease of the ovaries and breasts may occur with the usual symptoms indicating such disease.

Probably the most serious symptoms arise from the absorption of toxins and their effects on the nervous system especially. These are faintness, giddiness, neuralgia, headache, mental depression and depreciation, abnormal drowsiness, change in disposition, abnormal irritability, and loss of control over one's temper. Other symptoms are loss of fat, coldness of hands and feet, pigmentation or dirty color of the skin or conjunctivæ, and sometimes a bad odor from the skin or perspiration.

Complications of an acute or chronic character are liable to occur, such as volvulus, gall-stones, ulcer of the stomach or duodenum, and a predisposition is created to such general diseases as tuberculosis, gout, rheumatism, and arteriosclerosis. Mr. Lane has described certain contractions of the tissues which produce sharp angulations of the hepatic and splenic flexures of the colon and especially a kink in the ileum about two inches from the cecum, the "Lane kink." The cause of this kink or sharp angle is the pull of the overloaded cecum which drops into the pelvis, making traction both on the ileum and appendix, which bend sharply at their fixed parts, and symptoms appear indicating more or less obstruction of these two organs.

It had long been suspected that certain changes in the colon caused constipation, and many of us who have operated on the colon for malignant disease, etc., have been impressed with the tendency to diarrhœa which follows its removal. Therefore the thought naturally occurred that constipation might be cured by removal of the colon. The suggestion to remove the colon has been attributed to Metchnikoff but Lane's operations were being done before he knew anything of Metchnikoff's views and the latter sent his assistant, Dr. Cohendy, to London to study Lane's cases after removal of the large bowel. The work was done in Sir Almroth Wright's laboratory and the conclusion reached was that digestion was carried on perfectly without the large bowel and that the feces differed from the normal only in the absence of certain flora which occupy the cecum.

Lane's first operation was for pain in the cecal region, which persisted after removal of the appendix and division of bands and adhesions about the cecum and flexures of the colon, and consisted in making a lateral anastomosis between the ileum and sigmoid. Later he divided the ileum and was struck with the disappearance of the toxic effects after excluding the colon from the fecal current.

"In several cases after some months the patients were occasionally annoyed by the presence of hard dry masses of fecal matter in the cecum. They produced no autointoxication but the discomfort arising from their presence and from flatulent distension was sufficient to call for the removal of the large bowel as far as the splenic flexure. These hard masses are not necessarily the result of regurgitation but are probably formed in the large bowel."

Lane's operation then consists in dividing the ileum near the cecum, closing the portion attached to the cecum and anastomosing the other end with the upper part of the rectum or the lower part of the sigmoid, thus eliminating the colon from taking any part of the fecal current. The colon may be removed at the same time if it be thought proper but it seems safer to leave the colon for removal at a later operation should it become necessary.

In a paper read before the American Surgical Association in 1909 Mr. Lane states that of the large number of private cases in which the ileorectal anastomosis was made there was no death from the operation and of the nine cases in which he removed the large bowel there was one death. In the discussion which followed no one frankly approved the operation while some distinctly opposed it as being ultraradical. But it seems to me that Lane well and fairly puts it in the following words: "In no circumstances should operative interference be contemplated till the surgeon has satisfied himself that every other means of treatment have failed, whether medical or mechanical." He simply offers a remedy for

those who would be otherwise without remedy. Many a constipated individual, by means of enemas, pills and powders, and purgative waters has been enabled to live a long, useful, and comfortable life. It goes without saying that in such cases the operation is not indicated.

I have treated two patients in whom I thought the operation was indicated.

CASE 1. Miss W., white, aged 33 years, native of Va. and a school teacher, was admitted to Georgetown University Hospital in November, 1910.

History. Ever since childhood she had been troubled with constipation and abdominal discomfort. As she grew older she suffered much from abdominal pain, especially in the region of the pylorus, became nervous and began to have abdominal "spells." These the patient described as coming on every two or three weeks, with palpitation of the stomach and a horrible feeling in the stomach. No vomiting or severe pain at such times. She often found relief from these spells by using a stomach tube and washing out the stomach.

Examination. Patient very thin, blond, but skin of muddy color, broad hips, narrow upper abdomen and lower chest. Stomach resonance three inches below the navel. One test meal showed absence of acid. Patient very nervous, irritable, poor appetite, and never has a bowel evacuation without an enema or a purgative. Says she is miserable all the time and especially dreads the abdominal "spells." She has been treated by many physicians, under the diagnosis of gall-stones, appendicitis, ulcer of the stomach, and floating kidney.

It was evident that the patient was a victim of visceroptosis and of dilated stomach with chronic constipation and resulting autointoxication. Whether she had cholecystitis, ulcer of the stomach, or appendicitis was not clear. It was thought best to operate with a view of doing either a gastroenterostomy for the dilated stomach or a Lane operation for the chronic constipation. The operation was done November 30, 1910, incision through right rectus muscle. Liver and gall-bladder normal, right kidney quite movable, capable of displacement 2½ inches. The stomach had the appearance of an hour-glass contraction, due to peristaltic contraction which continued for some time, sometimes forming two, sometimes three pouches. Finally relaxation took place and the stomach was seen to be quite large, its lower border extending below the navel. The colon, with the exception of the cecum and sigmoid was all in the pelvis with the small intestine. The ileum was divided two inches from the cecum, the cecal portion closed with pursestring suture and the other end was joined end to side with the upper part of the rectum. From this operation the patient recovered without incident. There was never any diarrhœa in her case, but now and then a tendency to constipation. The patient improved in every way, in strength, weight, complexion, temper, and nervousness, but six months later she still had the nervous spells occasionally. In June, 1911, she observed an enlargement of the right side of the abdomen. Examination easily convinced one that it was due to hard masses in the colon. They were not painful, but the patient began to worry over their presence and it was decided best to complete the operation now and remove the colon. This was done July 5, 1911, the entire large bowel being removed to within about three inches of the junction with the ileum.

The bowel removed was somewhat shrunken and contained in the cecum and ascending colon four or five hard, odorless, almost dry, dark green masses of fecal matter. During the operation the increase in fat since the previous operation was observed and the size of the stomach was less.

From this operation the recovery was prompt.

In a letter received nearly three months after the last operation she informs me that she is again teaching school, that she is sometimes troubled with gas in the stomach, but that the nervousness and constipation are much better though the constipation is not yet entirely relieved. She has fattened 12 pounds, and is generally a great deal improved in health.

CASE 2. Mrs. N., white, aged 42, nativity Ireland, occupation servant, was first seen in November, 1908. She was the mother of five children and for a long time had suffered from constipation. For a year she had been troubled with pain in the epigastric region, vomiting, and lost much in weight and strength. A firm mass could be felt in the epigastric region and cancer was suspected. At the operation November 10, 1908, it was found to be a case of visceroptosis, but the liver seemed to be chiefly affected, having dropped down until the round ligament ran upward instead of downward, to the navel. Both the round and suspensory ligaments were shortened and the liver was elevated about two inches. Recovery was uneventful but the patient was not much benefited. She was very thin and still suffered with dragging sensations in the abdomen, nausea, occasional vomiting, cold extremities, and nervousness, with spells in which she felt as if her legs could not support her, as though her hips were coming apart.

May 8, 1911, she was again subjected to operation. The liver was found still in the position in which it had been anchored. The stomach was low and the greater part of the colon was in the pelvis. The ileum was divided, both ends closed and a side to side union was made with the upper part of the rectum. Recovery was prompt and improvement almost immediate. Patient was out of bed in three weeks and at first was troubled with diarrhœa, but this was controlled by regulating the diet and soon the passages became normal, appetite was better, she gained in weight, and there was general improvement in every way when she left the hospital five weeks after the operation.

ATROPHIC ARTHRITIS[1]

By A. R. SHANDS, M. D., Washington, D. C.
Professor of Orthopedic Surgery, George Washington University and the University of Vermont

THE object of the writer in reporting these cases is to bring to your attention, in a practical way, a class of cases that are fully appreciated by but very few general practitioners, although such cases are not at all uncommon; just the opposite — they are very common. The average physician has contented himself with calling them rheumatism, and has so treated them, with all sorts of so-called anti-rheumatic remedies, to no effect. The writer has been as guilty of the same mistake as the rest of you. The reason for this is that, until within the past few years, we have had practically no information on the subject of the etiology and pathology of this disease. The valuable information recently given to the profession by Goldthwait, in his thorough investigations along these lines, has removed the subject far from the field of speculation and placed it on a solid scientific basis. He says in his recent book on "Diseases of Bones and Joints," "That it is a clinical entity, however, recent pathological study and more thorough clinical investigation seem to have proven beyond any reasonable doubt, and although there are still difficulties in the way of a positive diagnosis in cases which approach the border line of better-known types of arthritis, yet our constantly increasing ability to make finer distinctions in physical signs enables us in a great majority of cases to make an exact diagnosis." He tells us that it belongs to adult life in its middle and early periods, but rarely before the fifteenth year. The cases of arthritis occurring prior to that age can doubtless be classified under a type due to infection, and have no definite relation to the disease under discussion. The onset of atrophic arthritis is such as not to suggest an infection.

The pathological changes that are found involve all of the structures of the joint — cartilage, bone, synovial membrane and at times the fluid that lubricates the joint. Goldthwait says the earliest lesions in the tissues of the joint occur in the synovial membrane, and take the form of what is perhaps best described as a villous arthritis, The formation of these synovial villi in fringes is a very slow process, varying from one to four or five years, according to the resistance of the individual capacity for repair. The next lesion to occur is in the cartilage, which loses its customary glistening appearance. There is also a diminution in its thickness, occurring symmetrically all over the bearing surfaces of the cartilage, which, in certain situations, may go in far enough to produce erosions, varying in size from an area as large as a split pea to that of a five-cent piece. This is most beautifully shown in the specimens I have secured from cases two and three here reported. Following the absorption of the cartilage, bony changes take place, but not to such a marked extent as in the cartilage. The general appearance of the joint would at first sight indicate a considerable increase in the synovial fluid, but such is not the case; there is, as a rule, but little increase in the fluid. The swelling of the joint is due to the villous thickening of the soft parts. This was a very prominent feature in case one.

In considering the clinical history of atrophic arthritis it is observed that, as a rule, it is a poly-articular affection. My experience has been that such is the case except in the cases that give a clear history of traumatism. In such cases my observation has been that it is mon-articular. All three of the cases here reported give a clear and unmistakable history of a severe injury to the knee as the beginning of the trouble. The absence of pain in the early stage of this affection is a most important factor to be considered in differentiating it from rheumatism. The patients in my experience do not suffer much pain until after the disease is well established and joint distortion has taken place, which does not occur until the erosion of the cartilage is well

[1] Read before the Washington Surgical Society, October 20, 1911.

advanced. The pain is caused by the eroded surfaces rubbing over each other. When erosion of cartilage has taken place, and there has been found the synovial villi, then muscle spasm is established, which causes the distortion of the joint, and after this condition has existed for some time the joint appears to be practically ankylosed.

The above is rather a dark picture of this disabling affection, but it must be borne in mind that only a small proportion of the cases, whether treated or not, progress to crippling deformity. There are many mild cases that result in spontaneous recovery, and there are many bad cases to recover under proper treatment.

Goldthwait states that the treatment now advocated is a radical departure from what has been the general practice in the not very remote past. He refers to the custom of this affection having been treated with the standard anti-rheumatic remedies and by depleting the patient by diminishing the amount and changing the character of the food, and giving no attention to the joints themselves, except by applying external lotions and ointments; nothing having been done to prevent the development of deformity or to preserve the function of the joints.

The treatment, now that a little more is known of the etiology and pathology, is to do everything possible to improve the patient's general condition by the most generous diet that can be taken care of properly by the patient's digestion, and the omission of all drugs that have been supposed to have any direct influence on the disease itself.

My experience has convinced me that the mechanical treatment of the joints is the correct one. Little can be done by mechanical appliances to the small joints. The knees and ankles are the joints that will demand the most attention, and are the only joints that will be referred to. The means that I use to preserve the function of these joints and to prevent deformities are the adhesive plaster strapping and the immobilization of the joints with plaster-of-Paris. If these cases are recognized early, that is, before the cartilaginous destruction has actually taken place, and properly treated, but few fail to give almost perfect results. Good results are obtained even after distortion of the joints has taken place. In such cases, the distortion must be corrected at once; in the majority of the cases an anæsthetic will be necessary to correct the deformity, which can be done by overcoming the contraction of the hamstring tendons by manual force; but if the contraction of the tendons is of long standing, tenotomy will have to be done. No definite time for the retention of these knees in plaster-of-Paris can be given, but they should be kept immobilized just as long as there is a tendency to recurrence of the deformity after the plaster is left off. In the case of average severity, from two to four months will be long enough. When the plaster can be left off massage and gentle passive motion should be used. In some cases crutches will be necessary after the plaster is left off.

In spite of the best treatment, there will be some cases that will not yield to this treatment. These are the cases that have developed villous thickenings, or synovial fringes, which act as foreign bodies in the joint and cause great pain by getting pinched between the patella, tibia and femur. These are the cases that can be only relieved by radical surgical interference. My experience with the removal of these synovial fringes has been most gratifying. Practically perfect results have been obtained in every case I have ever operated upon before there has occurred cartilaginous erosion to any great extent.

It is regretted that time will not permit me to report in detail numerous cases illustrating the different degrees of this disease that I have treated by both non-operative and operative method, but as it is only the purpose of this paper to call your attention to this subject in as brief a manner as possible, I must desist. Any one especially interested in the subject will find a very exhaustive article on it in the recent publication by Goldthwait, Painter and Osgood, above referred to. The three cases that have been selected in illustration of the facts that I have endeavored to call your attention to are of the worst type. Fortunately, there are but few cases requiring such radical treatment as these three.

CASE 1. Miss D., age 18. Nothing of special interest in her family history. Personal history excellent until present illness. Patient is an unusually well-developed young lady. Has never had any serious illness until she was fifteen years of age. At this time she developed a synovitis of one of her elbows, which became purulent and was operated on by Dr. W. P. Carr in the fall of 1906. The wound healed kindly by suppuration without any restriction of motion of the joint.

In the winter of 1908 there appeared an ulcer in the old cicatrix about the size of a silver half-dollar. This was treated by her physician, Dr. E. E. Field, of Norfolk, Va., with simple remedies, but with no result. This ulcer was later proven to be a lupus, and was treated with the X-ray with a perfect result.

This patient was first seen by me in consultation with Dr. Carr, November 15, 1906. At that time the knee was slightly swollen from a boggy infiltration of the periarticular structures, there being but little fluid in the joint; all motions were free and painless within a limited arc. The history of the beginning of this knee trouble is indefinite. The patient does not remember having sustained any injury to the joint, but says that she did a great deal of skating the winter before the trouble began, and had a good many tumbles, but nothing to disable her. Early in the summer she developed a general weakness in the knee; it frequently gave way with her, and soon began to swell, which increased until she was completely disabled. This was in September, at which time the knee-joint was aspirated by Dr. Field, and a plaster-of-paris cast was applied, which only remained on for one week, when the knee was again aspirated; this was repeated three times.

On the 25th of November I applied a brace with side-bar extending from the shoe to the upper third of the thigh on the outside, and the inner bar extending down to the middle of the calf. The brace had a lock joint at the knee to cause her to walk with immobilized knee. From the time of the application of this brace she did wonderfully well, being able to go without the brace with comfort a part of the time, until the spring of 1908, when the knee, without known cause, began again to swell and to be quite painful on any unusual exercise. She was brought to me again on July 15, 1908, at the suggestion of Dr. Field.

I found the knee much swollen and joint apparently distended with fluid, being about one-third larger than its fellow. At this time she was unable to walk with comfort without the brace. There was at this time decided limitation of motion, owing to muscular spasm, and passive motion was quite painful. Her general condition was poor, and as she was on her way to the mountains to spend the summer, I advised postponement of any operative interference until the early fall, on her return to Norfolk. In the meantime the knee was kept strapped with adhesive plaster. She returned on September 24th, when I found the knee immensely swollen, but her general condition much improved; she had gained about twenty pounds in weight and presented a picture of good health. The knee was still very painful on passive motion. The next day, September 25th, under general anæsthesia, I made an incision on the inner aspect of the knee, just about one-half inch below the margin of the patella. There was a discharge of a small quantity of an amber-colored fluid. Upon inserting my finger into the knee-joint I found that it was distended with a soft growth, filling the entire cavity of the joint. A second incision was made on the outer aspect of the joint, just below the patella. This incision was extended until the growth was plainly visible, which made the incision about four inches long. The specimen here shown was about one-fourth of the mass in the joint. Much of the growth was very friable and was easily removed with my finger. It was closely adherent to the base of the synovial membrane, which was very much thickened and was as tough as chamois skin. The articular cartilages were much eroded around the edges.

The joint was thoroughly cleaned out and irrigated with a weak bichloride solution, then closed without drainage. The result has been perfect. The stitches were removed on the seventh day, and motion allowed. The patient left the hospital at the end of two weeks, being able to walk with almost perfect comfort without the aid of her brace, and had about two-thirds of the normal range of motion. I instructed her to continue the use of the brace as a convalescent support as long as she feels the need of it.

The greater part of the growth filling the joint was simply a large mass of hypertrophied synovial fringe. The organized part of the growth proved upon microscopical examination to be a fibro-lipoma.

I examined this patient three years after the knee was operated on, and found that her knee is practically normal in every respect.

CASE 2. Mr. W., age 35. Gave a definite history of having received a severe injury in the way of a strain and contusion of the knee-joint about ten years before consulting me. From the intelligent history I obtained from him, I felt confident that he had, immediately following the injury, a marked case of traumatic synovitis. In brief, the history of the case from the onset of his trouble was one of recurring traumatic synovitis plus the condition of atrophic arthritis which dated from the original injury.

During the ten years above referred to, he had attacks of so-called rheumatism in the knee from three to four times each year, and was treated by numerous physicians, each one treating him for rheumatism with all of the usual anti-rheumatic remedies; in spite of which, his trouble continued to grow worse, "suffering many things of many physicians," etc.

I first saw him March 5, 1907, at which time he had been forced to the use of crutches. The knee

was very much swollen, on account of the boggy infiltration of all the periarticular structures with a moderate excess of synovial fluid. The knee was flexed to a right angle, was practically ankylosed, and was extremely painful on the least attempt at passive motion.

This gentleman had suffered so much with his knee for such a long time, he was rather anxious for an amputation. I did not feel justified in sacrificing the limb without first giving him a chance of relief by means of an excision; although the prospect for bony union was not encouraging, on account of his general condition, he being much reduced in flesh and very anæmic.

I excised the joint March 12, 1907. The joint was thoroughly disorganized. The semilunar cartilages, crucial ligaments, and lateral ligaments had been absorbed to such an extent that they were not recognizable as such. The articular cartilages of both femur and tibia had been almost entirely absorbed, there being only a few islands of normal cartilage left, about the size of a dime. The joint capsule was much distended with synovial fluid and a large quantity of coagulated lymph about the consistence of soft jelly. There was no evidence of pus in the joint, but, in the light of subsequent results, there must have been some form of purulent infection. All went well after the excision for about a month, when the patient began to suffer a great deal of almost constant pain. Upon the removal of the plaster-of-Paris cast, it was easily seen that there was no bony union taking place. The patient at this point developed a typical septic rise of temperature; the wound was reopened and found to be suppurating. From this time on the patient did very badly, losing flesh rapidly. Suppuration increased to such an extent that on June 5, 1907, I amputated the limb just above the femoral condyles. At the time of the amputation, the patient was a mere skeleton, but as there had been a close watch kept on all of the vital organs and as no change had been discovered, I felt sure his improvement would be very rapid. The stump healed by almost perfect primary union. Within three months the patient weighed more than ever before, even counting the weight of the lost limb.

The lesson to be learned from this case is that, in all probability, had the patient at the beginning of his trouble fallen into the hands of some one who would have made the correct diagnosis and treated him properly, the limb would have been saved.

CASE 3. Mrs. N., age 50 years. Was referred to me November 1, 1904, with history of having sustained a very severe wrench of her left knee about two years previously. The injury was immediately followed by great swelling, pain and fluctuation in the joint — a typical case of traumatic synovitis. Her recovery was only partial, and very slow. She was unable to walk on the joint for several months. During the two years above referred to, she had had numerous attacks of swelling and pain, following slight injuries, which were always diagnosed rheumatism, and treated accordingly.

The patient was a large woman, weighing about two hundred pounds, and in perfect health, with the exception of her "game" knee. The knee was flexed to an angle of about forty-five degrees and practically ankylosed at the time of my first examination. The least attempt to passive motion gave great pain.

The knee was strapped with adhesive plaster and bandaged snugly for about three weeks. This produced a marked diminution of the swelling and added much to the comfort of patient. On November 26, 1905, just twenty-six days from time of first applying the adhesive plaster strapping, the knee was straightened by manual force under ether and put up in plaster-of-Paris. The plaster was removed at the end of six weeks. After this the knee was kept strapped the greater part of the time. The knee remained straight, but caused much pain. The locomotion was benefitted but little, if any, by the treatment; hence I advised operative interference.

On November 27, 1905, just one year after the patient came under my care, I did an excision of the knee, and found almost exactly the same condition of the joint as has been described in case No. 2. The wound healed by perfect primary union, and in about three months there was solid bony union. I have recently examined this patient, and found that she is in perfect health, and has never had any more trouble with her so-called rheumatism.

PUBIOTOMY IN FACE PRESENTATION

By ARTHUR H. MORSE, M. D., Baltimore, Maryland
Resident Obstetrician, The Johns Hopkins Hospital; Instructor in Obstetrics, The Johns Hopkins University
(From the Obstetrical Clinic, J. Whitridge Williams, M. D., Director)

CASES of face presentation in which the chin becomes fixed in a posterior oblique position form one of the most serious complications with which the obstetrician has to deal. Various methods of treatment have been suggested. The oldest is the well-known procedure of Baudelocque, in which an attempt is made to push up the chin by introducing two fingers into the vagina, or, this failing, to introduce the whole hand into the vagina, dislodge the head and bring the vertex downward, while an assistant carries the back in the opposite direction by manipulations through the abdominal wall. Both these methods have as their aim the conversion of the unfavorable face into a favorable vertex presentation. If attempts at conversion fail, and podalic version be not ruled out either by too great lapse of time since rupture of the membranes or by the presence of some other contra-indication, the child may be turned and extracted as soon as the condition of the cervix permits.

If the head be so deeply engaged that it is impossible to dislodge it, the case may be treated expectantly with the hope that anterior rotation will take place when the face reaches the pelvic floor. If anterior rotation does not occur, a double application of forceps may be made and rotation of the chin anteriorly, beneath the symphysis, be attempted.

If all the methods just outlined prove of no avail, one must resort to craniotomy; or, provided the patient and child are in good condition, to some more radical operation.

So far as I can find after reviewing the literature of symphysiotomy and pubiotomy for the past twenty-five years, the first to suggest a pelvic splitting operation for this complication was E. P. Davis of Philadelphia, who ends an article, "The Management of Face Presentations," in the Medical News for 1894, with the following paragraph:

> If the head were impacted, and disproportion existed between the head and the pelvis sufficient to occasion difficulty in labor, the face presentation persisting, I should hope for a favorable result from symphysiotomy converting the face presentation into a vertex presentation and delivering the occiput in the manner most easily available after the pelvic joint has been opened.

This statement of Davis seems very logical when we remember the effect of a symphysiotomy upon the pelvis. As soon as the bones are cut through, the bone-ends gape for from 3 to 6 cm. The innominate bones flare outward, while the pubic tips become depressed downward. These changes give an increase in the capacity of the pelvic canal, particularly in the oblique and transverse diameters; while the antero-posterior diameter is less affected. The length of the conjugata vera is said to increase 2 mm. for each cm. of separation at the symphysis; and since this separation may be from 3 to 6 cm., the corresponding increase in the conjugate may be from .6 to 1.2 cm. It is important also to note that the separated ends of the severed bone afford space into which one parietal bone may fit, thus facilitating delivery.

If such changes in the pelvis take place after a symphysiotomy, one would expect similar changes after a pubiotomy, which is apparently the case.

Up to May, 1910, twenty-five pubiotomies had been done in the Obstetrical Clinic of the Johns Hopkins Hospital, with no maternal and only three fœtal deaths. Of the latter, but one could be attributed to the operation. All patients were delivered by forceps or version immediately following the pubiotomy. There were no bladder injuries and only six perineal and five deep tears, although twelve out of the twenty-five patients were primiparæ. The after-treatment was comparatively easy, and there was but little discomfort on the part of the patients. All cases on discharge were able to walk without difficulty or pain. Of these cases, all were either vertex or breech presentations and, although Dr. Williams had already suggested that pubiotomy

might possibly be indicated in posterior chin presentations, the opportunity for giving it a trial in such a case did not offer itself to us until June, 1910.

It is the object of this paper to describe in detail the case in which pubiotomy was done, to review four other cases which have been reported, and to outline a method of treatment for the future.

Case 4453, colored; 24 years of age, vii para. Previous pregnancies normal; deliveries spontaneous. Menstruation appeared at 13 years of age. Last menstrual period October, 1909. With the exception of some œdema of the legs, present pregnancy normal. Pelvic measurements 22.75, 23.25, 29.5, 18.5; C. D. 11.5; tubers, 10; ant. sagittal, 4; post-sagittal, 8; antero-posterior of outlet, 11.5. Diagnosis: Generally contracted rhachitic pelvis.

The patient said that her pains began June 24th at about 3 A. M., the membranes having ruptured 1½ hours previously. Pains continued throughout the day, June 24th, being about ten minutes apart. Toward midnight they became more severe, and as there was no advance, the midwife who had attended her during the day, and who had made several examinations, sent to the hospital. The patient was first seen by the Outside Obstetrical Service at 12:30 A. M., June 25th, when Dr. Wilson found the cervix nearly fully dilated, the child lying in R. M. P. She was brought at once to the hospital.

External examination after admission showed very clearly that the breech was in the fundus, the back on the left anteriorly, and the small parts on the right posteriorly. The cephalic prominence was very definitely felt on the left side. The fœtal heart was in the right flank, strong, regular and 37 to the quarter. The general condition of the patient was excellent, the pulse being 94 and the temperature 99.6.

Internal examination showed the cervix fully dilated, the head markedly extended, the face occupying the right oblique diameter, with the chin directed toward the right sacro-iliac synchondrosis and about two finger-breadths above the spines. The contraction ring was very definitely felt in its whole circumference.

Considering the fact that the membranes had ruptured twenty hours previously, and the apparent thinning of the lower uterine segment as shown by the marked contraction ring, treatment by version and extraction was at once ruled out. But it was thought that possibly under anæsthesia the unfavorable R. M. P. might be converted into a favorable L. O. A. Accordingly, the patient was brought to the edge of the bed and anæsthetized with chloroform. Flexion was then attempted by pushing the chin upward, with one hand in the vagina, and the occiput downward, with the other hand over the abdomen. The procedure proved unsuccessful because of the marked contraction of the body of the uterus over the child.

The patient was then put upon the operating table, the aim being to do a Scanzoni operation and extract the child in a mento-anterior position if possible, and if this failed to do a pubiotomy.

Considering the increase in the diameters of the pelvic canal which occurs after a pelvic splitting operation, and the success which had attended the previous performance of pubiotomy in various hands in this clinic, we felt fully justified in attempting it in this case, if necessary, particularly since the only alternative would be craniotomy upon a living child in excellent condition.

Accordingly, the usual preparations for operation were made. The outlet was dilated manually. It was found possible to rotate the head manually from the right mento-posterior to a right mento-transverse, although it tended strongly to resume its original position. Forceps were then applied to the sides of the head in right mento-transverse. The posterior blade was easily placed, but owing to the proximity of the head to the pubis, and its position at the superior strait, the anterior blade was put on with great difficulty and could not be rotated into place satisfactorily. Forceps were twice applied, but it was not possible to rotate the chin anteriorly or to bring about descent. Since it seemed that the result of further manipulations would be uncertain and might tend to rupture of the lower uterine segment, it was felt that the most conservative method would be to proceed with pubiotomy instead of attempting to turn the chin and extract.

Accordingly, an incision about 3 cm. in length was made on the left side of the symphysis and the tissues separated from the posterior surface of the bone by the finger. A Doederlein needle was then passed downward close behind the bone, the point emerging through the left labium majus. The Gigli saw was then attached, drawn upward and the bone sawed through in the usual manner. There was a slight amount of hæmorrhage, easily controlled by pressure.

Forceps were now applied to the sides of the head in right mento-transverse, the anterior blade slipping into place with ease, and traction was made. The chin was easily rotated beneath the symphysis and a comparatively easy extraction followed in mento-anterior, the bone-ends gaping about 5 cm.

The child was only slightly asphyxiated and readily revived.

The third stage was uneventful.

The upper incision was sutured with two layers of interrupted catgut. There was a slight tear in the left lateral wall of the vagina, through which an iodoform drain was placed up to the severed bone. The rest of the tear was sutured with continouus catgut. A drain was also placed through the enlarged needle-hole in the left labium to prevent a possible hæmatoma.

Because of the possibility of an infection, a hot

saline douche (115° F.) of 1000 cc. was given. A barrel of ergotole was also given hypodermically.

The thighs were strapped in the usual way with adhesive plaster and the patient returned to bed in good condition. She voided the afternoon of the day of operation. No drugs were given with the exception of urotropin gr. V, q. 4 h.

The third day after operation the vaginal drain was removed. There was only slight œdema of the vulva at this time.

Later in the puerperium, because of a slight but persistent incontinence of urine, the vagina was carefully examined. On exposing the anterior vaginal wall, a retracted tear was found in the left sulcus, about 2 cm. above the outlet. This apparently corresponded to the laceration produced at the time of delivery. At its lowest angle was a small reddened point about 3 mm. in diameter. Upon injecting salt solution colored with methylene blue into the bladder, the blue fluid was readily seen to run out at the above mentioned point, conclusively demonstrating the presence of a vesico-vaginal fistula.

During the succeeding two weeks this fistula healed spontaneously and the leakage of urine ceased. The highest temperature during the patient's stay in the hospital was 101.6, on the twenty-fourth day.

On discharge there was neither pain nor difficulty on locomotion. The pubiotomy wound was well healed. There was a definite depression over the anterior surface of the bone at the site of incision, and mobility of the severed bone-ends could be made out on passive movements of the thigh.

The child weighed 3460 grams. The head measurements were as follows: O. M. 13.5; O. F., 12; S. O. B., 10; Bi. P., 10; Bi. T., 8; S. O. B. circumference, 33.5; circumference of shoulders, 35.5; length, 48 cm. It weighed on discharge 4260 grams.

So far as I can assertain, only four other cases of pubiotomy for face presentations have been reported.

The first to carry out the idea suggested by Davis, either in America or abroad, was E. B. Montgomery, of Quincy, Illinois, who in 1894 performed an extra-median symphysiotomy for a posterior chin presentation in a normal pelvis. The patient was a primapara, thirty-five years of age, whose pregnancy had been normal. The onset of labor pains occurred eight hours after rupture of the membranes, and from that time were almost continuous. After two hours of pains, it was found that the brow was the presenting part. Attempts at conversion failed, and, as labor went on, the chin became impacted in the hollow of the sacrum. The patient was then removed to the hospital.

The description of the operation is as follows:

An incision 3.5 cm. in length was made over the symphysis in the median line, and an attempt made to sever the articulation with a strong scalpel. Owing to what at the time was supposed to be an ossification of the joint, this was not possible, and a small metacarpal saw was used for severing the bone, the subpubic ligaments being afterward cautiously dissected from the bone with a scalpel. A metal catheter in the urethra and the index finger were used as a guide. After division of the symphysis, which was fully 5 cm. in depth, the patient was brought to the edge of the table and thighs abducted, giving a separation of 6 cm. at the symphysis. Forceps were applied, and with some difficulty the child delivered, which was living, but so cyanotic and asphyxiated that it survived but 30 minutes. The child's head was less than 10 cm. in the biparietal diameter, and delivery could easily have occurred in this mother but for the faulty position of the child.

My operation, though made in the midline, was evidently an extra-median symphysiotomy, the joint being most frequently found, according to those who have carefully investigated the matter, to one side or other of the median line. What we supposed to be the ossification of the joint was the result of our not having found it.

This case is of interest, because, although a symphysiotomy was planned, a pubiotomy was really done.

The second case is one of a series of twenty-one pubiotomies done in Leopold's clinic and reported by Kannegiesser.

The patient had a generally contracted rhachitic pelvis, the measurements being 21, 23.5, 28, 17.5; C. D., 9.25. Estimated C. V., 7.25. The presentation was a face, with the chin directed obliquely posterior on the right side. She was admitted to the clinic in labor, after rupture of the membranes, with the external os dilated to the size of a three-mark piece. As preparatory treatment of the soft parts, a colpeurynter was put in until full dilatation of the external os occurred. After its removal the head of the poorly developed child remained, in spite of strong pains and a trial of the lateral position, in the same unfavorable face presentation, jammed down at the pelvic inlet. A contraction ring had now formed, so that longer delay was contra-indicated. Forceps was ruled out, because of the high position of the head and the abnormal presentation. Podalic version was excluded because thirty-five hours had elapsed since rupture of the membranes.

Pubiotomy was done on the right side, and an attempt made to deliver by forceps the face, which now entered the pelvis in its transverse diameter. In spite of the widening of the pelvis, the attempt

failed; the head slipped back each time. As a last effort to save the child, an attempt was made at podalic version, but on introducing the hand into the uterus it was found that the pulsations of the umbilical cord had ceased. Accordingly, perforation and cranioclasis of the dead child was easily effected. It was a female, and weighed, after loss of the brain, 2,460 grams.

The woman made a good recovery and was discharged in good condition on the thirty-seventh day, the only complication being a hematoma of the right labium, which appeared immediately after delivery, and some œdema of the right leg.

The third and fourth cases were reported by O. Pankow in 1910.

The first case concerned a woman 27 years old, who had borne no children previously. The external pelvic measurements were 26, 29, 32, 20. The presentation was a face, with non-engagement of the head, and 21 hours had elapsed between rupture of the membranes and the time of operation. An open pubiotomy was done on the left side, followed by an episiotomy. Spontaneous birth took place after four hours. There was marked bleeding from the operation wound. The child measured 54 cm. in length, weighed 2,870 grams. and was living.

During the puerperium there was suppuration of the operation wound with marked fever. There was also streptococcic endometritis, although the blood was free from bacteria. There was œdema of the vulva for the first six days; and thrombosis, first of the left, then of the right leg. The patient was allowed up on the thirty-eighth day and discharged on the sixty-seventh day.

Pankow's second case was a woman 28 years of age, who had not previously borne children. The pelvic measurements were 26, 28, 31, 19; C. V., 10.5; tubers, 11. The diagnosis was a slightly flat pelvis. The duration of labor between rupture of the membranes and the operation was twenty-eight hours. An open pubiotomy was done on the right side. Following the operation the head entered the pelvis, but anterior rotation of the chin did not take place; and eight and a quarter hours later forceps were applied in a deep transverse position, because of the bad condition of the fœtal heart. The child on extraction was deeply asphyxiated and could not be revived. It weighed 3,100 grams and measured 54 cm. in length. The puerperium was afebrile. The patient was allowed up on the thirteenth day and discharged on the twenty-fourth day.

In reviewing these five cases, it might appear at first glance that from the standpoint of mother and child, pubiotomy in such a complication does not offer much; but upon analysis we find points which readily account for the unfortunate results. Thus, we are led to the conclusion that Montgomery's case would have had a happier outcome had the child been in better condition at the beginning of the operation. From the standpoint of the mother, the result was good.

In Kannegiesser's case, with an estimated true conjugate of 7.25 cm., the extraction of a normal-sized child presenting favorably would have been difficult, even after pubiotomy. The treatment accorded to both of Pankow's cases differs quite radically from that carried out in this clinic. The open pubiotomy has been done but once here, all other cases having been operated upon by the technique of Doederlein. Taking all things into consideration, it would seem that an open wound in the region of the genitalia affords greater chance of infection; its only advantage being in those rare cases where it becomes necessary to discover and ligate a bleeding aberrant artery. Nor do we believe in awaiting spontaneous delivery after operation, since this is an uncertain procedure, which not only increases the chance of infection in the mother and of injury to the child from asphyxiation or pressure, but may ultimately call for a second anæsthesia and forceps. We therefore interfere radically, and feel that better results are obtained by completing delivery at one sitting.

Doederlein, it is interesting to note, has also arrived at the same conclusion, and in a recent communication records three cases in which he feels that the lives of the children would have been saved had delivery been effected immediately after pubiotomy. He now recommends, with Leopold, Tauffer and Schauta, that this procedure be followed, instead of awaing spontaneous delivery.

In Pankow's second case the fœtal heart became irregular during the wait for spontaneous delivery, and the child died soon after extraction, thus defeating the very object of the operation.

To condemn pubiotomy because of these unfortunate results to the child would be manifestly unfair. The fact that the lives of the children in these cases were not saved was not due to the operation *per se*, but because in the first case the child was badly asphyxiated; in the second, the operation itself was contra-indicated, while in the fourth

too long a delay was made in awaiting spontaneous delivery. From the standpoint of the mothers, the procedure was practically harmless, with the exception of Pankow's first case. The fistula in our case was of little moment, and soon healed.

Our attitude toward pubiotomy in relation to mother and child may be appropriately stated here. We believe that it should be regarded as a primary operation, to be performed in suitable cases of pelvic dystocia for the sake of saving the life of the child. From our experience with the operation in this clinic, we believe that in the hands of competent operators the mother is exposed to little immediate danger or future inconvenience.

On the other hand, we feel that it should be strongly emphasized that the operation is not justifiable where the fœtal heart is already in bad condition. For, under such circumstances, the child may die during or immediately following delivery. Therefore, if the fœtal heart be so irregular and of such poor quality as to make the outcome of operation doubtful, we believe that pubiotomy should not be attempted, but that, if necessary labor should be terminated by craniotomy.

Taking into consideration the successful outcome of our case, together with the general success of pubiotomy in this clinic, we believe that we are justified in drawing up the following provisional line of treatment for the future:

1. In cases of face presentation, where the chin is directed anteriorly and the pelvis is normal, spontaneous delivery may be expected. Conversion is not indicated, since it means the substitution of an occiput posterior for the anterior chin, the former being hardly more favorable than the latter. On the other hand, if the pelvis be contracted and spontaneous delivery does not occur, while indications for terminating labor present themselves, the saw should be laid as for a pubiotomy, forceps applied and extraction attempted. If this is not possible, and the heart of the child is still in good condition, the bone should be sawed through and the child delivered.

2. Where the chin is directed obliquely posterior, conversion should be attempted as soon as the condition of the cervix permits, thus substituting for the unfavorable mento-posterior a favorable occiput anterior position. If attempts at conversion prove futile, podalic version and extraction should be done as soon as the cervix becomes fully dilated; provided, of course, no contra-indications are present. On the other hand, if the head be so deeply wedged in the pelvis that conversion cannot be effected, while podalic version and extraction are ruled out, the head should be allowed to advance, with the hope that on reaching the pelvic floor anterior rotation may occur. If this fails and delivery is indicated, the saw should be placed as for a pubiotomy, forceps applied to the sides of the head, according to Scanzoni, and anterior rotation attempted. If it be impossible to turn the head or to cause descent, the bone should be cut through, when anterior rotation may be effected and the child extracted in a mento-anterior position.

3. If the chin be directly in the hollow of the sacrum, attempts at conversion are urgently indicated; and if these fail, podalic version with extraction as soon as the condition of the cervix permits. But if, in this case, the face be so firmly fixed that conversion and podalic version are ruled out, primary pubiotomy should be done, the head converted into an occiput anterior or not, as the case may indicate, and child extracted with forceps.

4. Pubiotomy should replace craniotomy in all face presentations, except where the child is already dead, or in so precarious a condition as to preclude a radical operation.

5. The rate and regularity of the fœtal heart should be carefully noted just before operation is begun, and should be sufficiently satisfactory to ensure a living child as the result of the operation.

6. The operation is contraindicated in face presentations where the conjugata vera measures 7.5 cm. or less, or when the woman presents signs of infection or previous attempts at delivery have been made by those whose aseptic technique is open to question.

7. Finally, it should be emphasized that pubiotomy should be regarded as an operation to be undertaken solely for the benefit of the child. Accordingly, it should be limited to

those cases in which there is a reasonable probability of obtaining living offspring. We consider it wholly unjustifiable to subject a woman to the operation, even though we have had no maternal mortality, if the child is in such bad condition at the beginning that it will not survive extraction.

An acknowledgment of great indebtedness is due Dr. Williams for his kind permission to report the case, and for his interest and valuable advice; to Dr. Slemons, who in Dr. Williams' absence from the city, so generously gave me permission and opportunity to carry out the treatment, and to my associates on the resident obstetrical staff, whose intelligent assistance made possible the successful result.

BIBLIOGRAPHY.

DAVIS, E. P. The Management of Face Presentations. Medical News, 1894, lxv, 45.

DŒDERLEIN, A. Über Extraperitonealen Kaiserschnitt und Hebosteotomie. Monatschr. f. Geburts. u. Gyn., 1911, p. 1.

KANNEGIESSER. Beiträg zur Hebosteotomie auf Grund von 21 Fallen. Arch. f. Gyn., lxxviii, h. 1, p. 52.

MONTGOMERY, E. B. Symphysiotomy in Persistent Mento-Posterior Presentation. Am. Jour. of Obst., 1904, i, p. 343.

MONTGOMERY, E. B. Pubiotomy and Its Relative Indications. Am. Jour. of Obst., 1906, liv, p. 771.

PANKOW, O. Kaiserschnitt oder Beckenspaltung? Ztschr. f. Geburts. u. Gyn., 1910. lxvii, p. 1.

WILLIAMS, J. W. Textbook of Obstetrics. D. Appleton & Company, New York.

WILLIAMS, J. W. Is Pubiotomy a Justifiable Operation? Am. Jour. of Obst., Aug., 1908, p. 202.

WILLIAMS, J. W. Is Pubiotomy a Justifiable Operation? (Second Communication.) Am. Jour. of Obst., May, 1910, p. 721.

SUBPHRENIC ABSCESS COMPLICATING APPENDICITIS

BY JOHN DOUGLAS, M. D., NEW YORK CITY, NEW YORK
Visiting Surgeon, Bellevue Hospital; Assistant Surgeon, St. Luke's Hospital

SUBPHRENIC abscess occurs as a complication of acute appendicitis in between .5 and 1 per cent of the cases, according to Ross (Journal A.M.A., August 12, 1911), who has analyzed the reports of a large number of statistics by Treves, Kelly and Hurdon, and Lance, and also 3,891 cases of acute appendicitis occurring in the German Hospital and Mary J. Drexel Home, Philadelphia, Pennsylvania. In the 31 cases reported by him there were 22 deaths. Of the 31 cases, from brief history reports, it would appear that in 15 the abscess was situated below the liver. In the remaining 16, where the pus was between the liver and the diaphragm or above the lower surface of the liver, there were only four recoveries.

The following two quotations from Ross' article prompt the report of this case with the X-ray photographs, illustrating their value as a means of diagnosis. "It is, to my mind, a refinement of diagnosis at present impracticable of accomplishment for any one to determine definitely the variety of subphrenic abscess before operation. As will be seen later, we are fortunate indeed always to diagnose even the existence of a subphrenic abscess." Later on, he states, "Only the most careful study of individual cases will give even an approach to correct diagnosis."

Grace S., age 13. Seen in consultation, July 31, 1911. Her illness began 11 days before with an attack of severe vomiting, which lasted 1½ days, when she began to have severe pain in the right side of the abdomen. The pain was severe and aching in character, continuous, not localized, and radiated to the back and right shoulder. It was increased by respiration. The pain had been gradually decreasing and was now most marked over the lower right chest behind, and in the axillary line. She had fever (103° to 104° F.) every evening, but no chills. Has had some cough but no expectoration. Was slightly jaundiced for three or four days, but jaundice had disappeared when she was seen by the writer. The bowels had moved every day.

Physical examination of the chest showed slightly diminished expansion and breath sounds, slight dullness and a few large, moist râles over the right base.

There was no general abdominal rigidity or tenderness, but over the upper right quadrant of the abdomen rigidity and tenderness were marked. A mass, apparently the lower border of the liver, could be felt two inches below the costal arch. This area

and just below it were very tender. Percussion in the right mammary line was flat from the fifth intercostal space down to the edge of the mass. There was some tenderness in the right costo-vertebral angle. The temperature was 103.2° F., pulse 140, respiration 30. The leucocyte count was 25,000 with 86 per cent of polynuclear cells.

A diagnosis of high appendicular abscess was made, and she was referred to St. Luke's Hospital for operation.

Operation. An incision 3½ inches long was made along the border of the right rectus muscle with its lower end about on a level with the umbilicus. The appendix was found with its outer extremity almost sloughed away, behind a high undescended cæcum just underneath the liver. There was a small amount of pus, with the characteristic odor of colon infection, well walled off from the rest of the peritoneal cavity by adhesions and the omentum, and limited above by the under surface of the liver. The appendix was removed. The liver had been apparently displaced downward, and examination demonstrated adhesions between the diaphragm and the upper surface of the right lobe. On separating these adhesions, a considerable quantity of bloody pus smelling of colon infection was discharged. A thick rubber dam drain was passed up a distance of 12 cm. between the liver and diaphragm and a counter-drainage opening made in the loin. The first incision was partly closed and drained with a rubber dam drain.

For a week following the operation there was a profuse discharge of bloody, purulent material, then pus, which gradually became less, but the patient continued to have an irregular temperature — up to 101° or 102° in the afternoon; the cough became more troublesome, while the physical signs over the base of the right lung persisted. It was believed that the subphrenic abscess was not draining, so, to determine this fact, the X-ray shown in the illustration was taken (Fig. 1). This demonstrated very plainly that the diaphragm above the liver was pushed upward to a point on a level with the eighth rib posteriorly. So an anæsthetic was administered on August 11th, the eleventh day after operation, and a long, soft rubber tube 1 cm. in diameter was inserted, to replace the rubber dam, with a further evacuation of pus. The cavity was irrigated through this rubber tube, and drainage was again profuse. On August 21st, a second X-ray was taken, showing the diaphragm considerably lower. The tube was removed and again replaced by rubber dam. The temperature stayed down for four days, but on August 27th rose to 103° again.

Under light chloroform anæsthesia, the adhesions between the right lobe of the liver and the diaphragm were broken up by the finger inserted through the incision in the loin, with the resulting escape of considerable pus. A 1 cm. rubber tube was introduced a distance of 12 cm. and the cavity, which was well walled off, irrigated.

As the adhesions were quite dense, the question arose whether the diaphragm had been perforated, with involvement of the pleural cavity, and a third plate was taken (Fig. 2), which demonstrated that the end of the tube was below the diaphragm. The following day the temperature was normal, and further recovery was uneventful. Fig. 3. Shows radiograph taken just before patient's discharge from the hospital, when diaphragm had almost returned to its normal position.

It is also of interest in this case to note the presence of jaundice, as Besredka (quoted by Ross) states, as a means of differential diagnosis, "there is never jaundice in uncomplicated subphrenic abscess."

The mortality of subphrenic abscess is about 33 per cent. It is lower in children than in adults, probably because the large majority of cases are due to appendicitis, while in adults a considerable number of cases are caused by perforation of the stomach or duodenum. Intrathoracic complications have been estimated to be present in 66 per cent of the cases. This is probably too high, as Ross states that of 21 cases coming to autopsy only 5 showed purulent pleurisy and 1 a pleurisy with exudate not purulent. Intraperitoneal abscesses, which are more frequent, are more apt to perforate the diaphragm than extraperitoneal.

The diagnosis is difficult. In addition to the quotation from Ross given above, Reeve (American Practice of Surgery, vol. 7, 1910, p. 487) says: "There are no certain physical signs by which in all cases, collections of fluid above the diaphragm can be distinguished from those situated below this structure." Also: "It is not possible to make a differential diagnosis between a subphrenic abscess and an encapsulated basal empyema." He advises, however, the use of the Rœntgen rays, and mentions a case in which Monro demonstrated the presence of subphrenic abscess by the X-ray after rib resection and several punctures had failed. Although writers on the subject allude to the unreliability of the physical signs, this case of Monro's was the only one found by the writer in which the X-ray as a means of diagnosis was made use of.

Fig. 1. Showing diaphragm displaced upward by abscess.

The physical signs usually found are dulness or flatness, diminished breath and voice sounds and vocal fremitus, with the presence of râles over the base of the lung, the area of dullness being characterized by being convex upward and not changing its area with a change in the position of the patient. In those cases where gas is present in the abscess cavity there are three zones of different resonance or percussion: The normal pulmonary resonance above, a zone of tympanic resonance caused by the gas below this, and the area of flatness caused by the pus which is continuous on the right side with the liver flatness. When there is also fluid in the pleural cavity there will be four percussion zones, an area of flatness intervening between the normal pulmonary tympany and the tympanitic zone caused by the gas. In right-sided subphrenic abscess the liver is apt to be displaced downward.

It is recommended by all writers on the subject that careful exploration with the aspirating needle be made in all questionable cases — and the diagnosis from the physical signs, being so uncertain, makes the majority of cases questionable. The certainty with which the situation and size of the abscess are shown in the accompanying radiographs demonstrates their great value in diagnosis, although probably they would not be so plain in a heavy adult as in a child.

It is believed that, had a radiograph been taken in the following case, the diagnosis might have been made which was impossible from the physical signs, and the life of the patient perhaps saved.

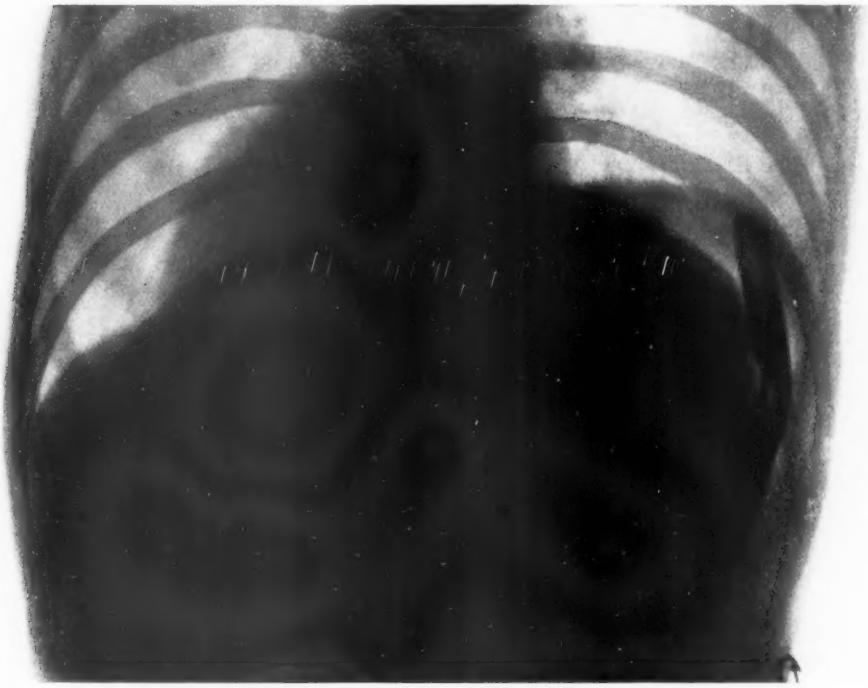


Fig. 2. Showing tube in abscess cavity between liver and diaphragm.

M. P., boy, age 8. Seen in consultation with Dr. J. F. Bell, of Englewood, N. J., Nov. 7, 1910. Patient had a gangrenous appendix and general peritonitis, a large amount of thin pus being present in the general peritoneal cavity, as was demonstrated by operation at the Englewood Hospital three hours after being seen by the writer. Patient reacted well from the anæsthetic, and for 10 days temperature was between 99° F. and 100° F., and the bowels moved daily. Patient, however, did not look well, and on the fourth day complained of pain in the *left* chest. Examination showed pleuritic friction râles over *left* base, which disappeared two days later, although he still complained of pain in left chest and abdomen, which pains continued irregularly for several days. On the tenth day after the operation, he still complained of these pains as well as pain in the throat and ears, and the temperature rose to 104.3° F., pulse 180. Careful, complete physical examination as well as exploration of the wound was negative. This examination was verified on the following (the twelfth) day by two additional physicians, who examined him in consultation. His leucocyte count was 21,400 with 79 per cent of polynuclear cells. On November 19th, the morning of the twelfth day, after a period of apparent relief and temperature subsidence, he suddenly developed, at 8 A. M., a harassing cough with scant mucus expectoration. At 9 A. M. there occurred an enormous purulent expectoration, which became bloody as œdema developed, with cyanosis, evidently due to the rupture of an abscess into the lung. This expectoration showed the presence of streptococci and some diplococci, and a bacillus, apparently the bacillus coli communis. The respiration became more shallow, cyanosis was marked, and the pulse ran up to 204. In about an hour and a quarter, the patient died, apparently drowned by the pus in the lung.

An autopsy in this case was refused, and while it is possible that the abscess which ruptured might have been in the lung or mediastinum, there were certainly no physical signs indicating its presence, except the friction râles over the left base for a few days, and no subjective symptoms except pain in the left chest and shoulder. It is therefore believed that this was a subphrenic abscess

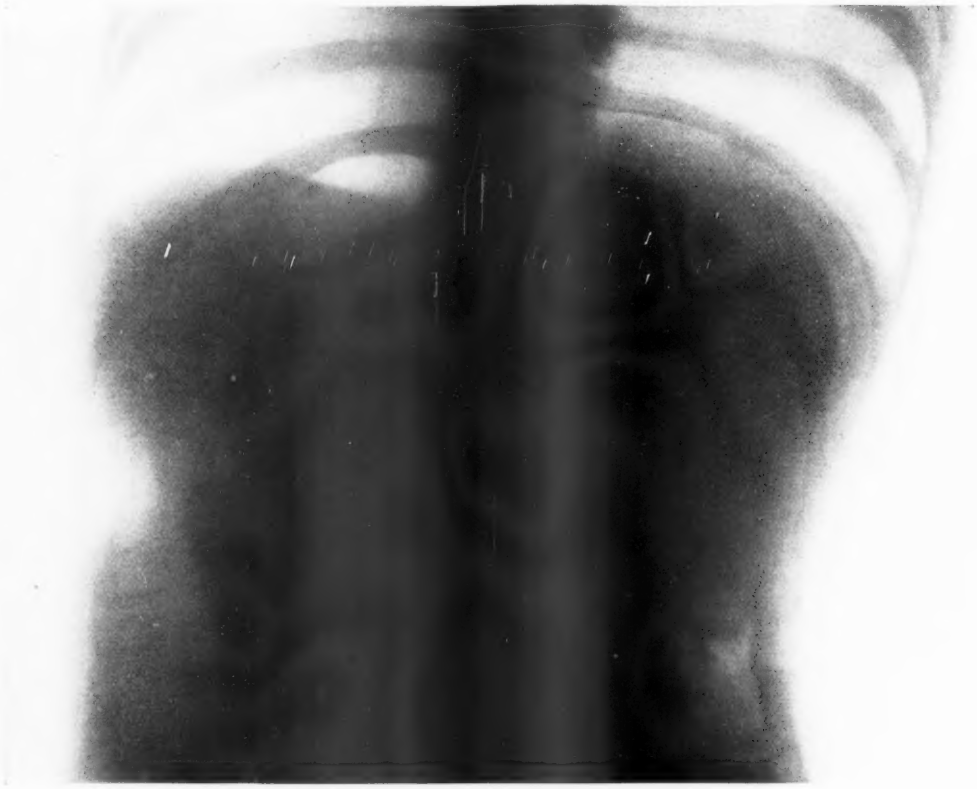


Fig. 3. Showing condition on discharge.

which ruptured through the diaphragm into the lung, which in the absence of physical signs might have been demonstrated by the X-ray in time to save the patient.

Treatment of subphrenic abscess consists of evacuation of the pus, either by means of an incision in the loin or abdomen, after dealing with the primary cause, and drainage with a rubber tube. This method was followed in the first case reported, and was satisfactory as long as the drainage tube was kept in place.

In abscess high up under the diaphragm more satisfactory drainage is obtained by the subpleural route, the tenth rib being resected in the mid-axillary line and the abscess opened through the diaphragm below the pleural reflection.

If the incision opens the pleural cavity (trans-pleural route), the pleura above should be closed, the diaphragm being sutured to the intercostal muscles in the incision to close off the cavity above before opening the abscess, which is then drained with a large rubber tube.

THE PREVENTION AND TREATMENT OF VENTRAL HERNIA[1]

By E. S. JUDD, M. D., Rochester, Minnesota
Junior Surgeon to St. Mary's Hospital

WHILE it is true that postoperative ventral hernia is a secondary consideration, and oftentimes unavoidable following a severe and extensive abdominal operation, it is also true that many times this condition can be prevented by the proper choice and manner of closing the primary incision.

It is frequently necessary to freely drain septic cases, in order to prevent extension of the infection, and in this class of cases we rarely make an effort to close the incision; in fact, we are satisfied if the patient lives, the hernia being a subordinate matter. Infection is the chief cause of hernias which occur in operative wounds. In a study of a large number of these cases which occurred in his clinic, Mikulicz found that infection was the cause of the hernia in the greater number. The giving way of a wound which was healed by primary intention is seldom seen, yet the few instances in which it does occur are altogether too frequent.

I wish to call attention to some of the methods we have used in St. Mary's Hospital to prevent these hernias. Many times we are tempted to remove an adherent appendix through a right rectus incision, which was made primarily for a gall-bladder operation, but in doing so we may be obliged to continue the rectus incision several inches downward, severing one or more of the important nerves, which may cause the muscle to atrophy and thus allow a hernia to develop. A separate split-muscle incision for appendectomy is, therefore, a wiser procedure in these cases.

In performing pelvic operations we often find it necessary to make a very large incision exactly in the midline, and in the closure we must deal with a thin, firm, slow-healing fascia, while, if the incision be made just to one side, we shall have a small strip of rectus muscle in one flap and a thick, heavy body of the rectus and its fascia in the other flap. (Fig. 1). In either case the closure would not be perfect, since the fascia alone, or the fascia with a small strip of rectus muscle in it, would not have good healing power. In making incisions of this kind it is always better to open the sheaths of both recti muscles and close the incision by bringing the muscles and their sheaths, respectively, together in the midline. (Fig. 2.)

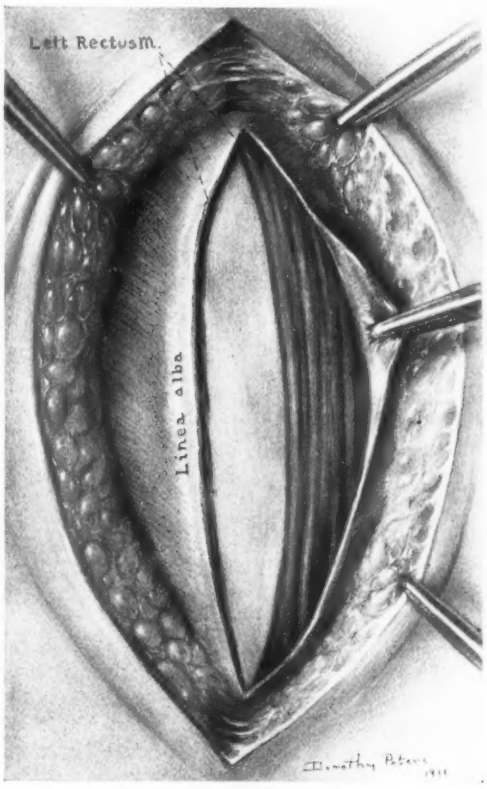


Fig. 1. Midline incision for pelvic cases. Showing incision slightly to the left of the linea alba, through the rectus muscle of the left side. A few fibers of the muscle on one side of the incision and the main body of the muscle on the other.

An incision made through the aponeurosis

[1]Read before the North Dakota State Medical Association Fargo, May 9, 1911

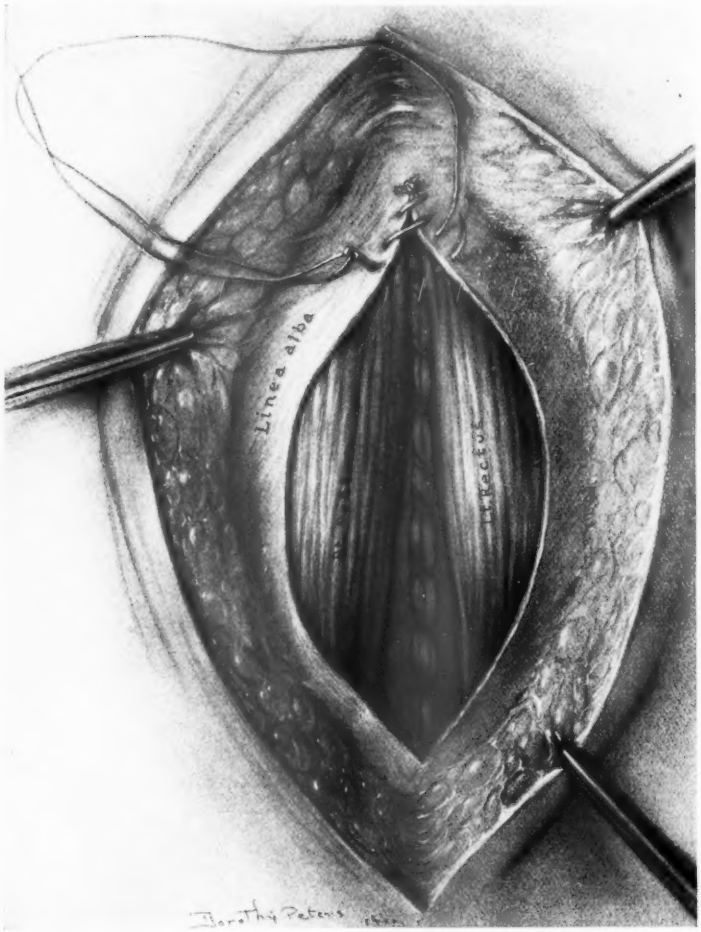


Fig. 2. Sheath of the rectus muscle of opposite side open so that the two recti muscles can be sutured together.

of the external oblique can be closed with a better degree of strength if the aponeurosis be imbricated. We have practiced this method of closing the McBurney or split-muscle incision, which we make over the body of the internal oblique muscle. The aponeurosis in this region is thin, firm and white, and the two edges sewn together will seldom heal. While this does not necessarily produce a hernia, it does allow the apneurotic flaps to retract and the edges to separate, making a broad, flat, and unsightly scar, which can be avoided by overlapping the aponeurotic flaps face-to-face instead of suturing them edge-to-edge. We have used this method of closure in several thousand operations performed in St. Mary's Hospital. Many of the cases were drained through the incision, and in only one instance (a large, fleshy female) have we known a hernia to develop.

Under no circumstances we do enlarge a split-muscle incision by cutting across the fibers of the internal oblique muscle. If the appendix be adherent toward the midline and the exposure is inadequate, we extend the incision through the internal oblique

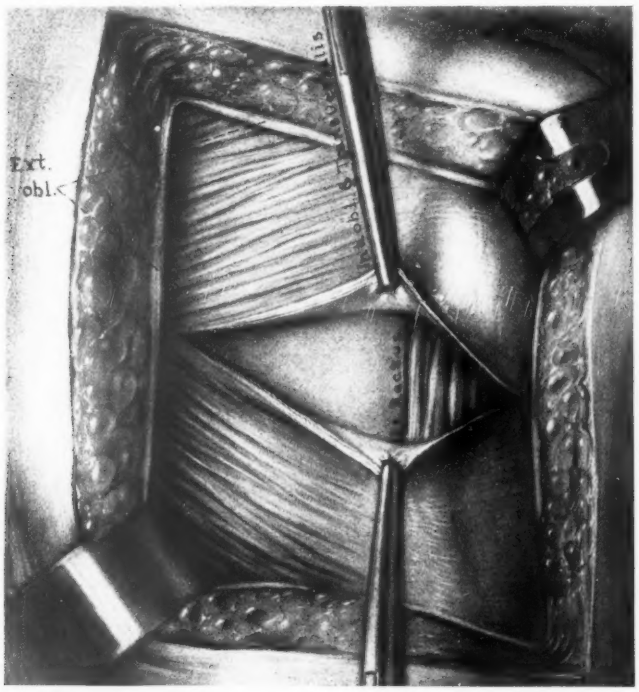


Fig. 3. Showing the sheath of the rectus muscle divided in line with the incision in the internal oblique.

muscle into the sheath of the rectus, not cutting the muscle fibers. (Fig. 3.) This will allow retraction of the rectus nearly to the midline, greatly increasing the working space and at the same time not interfering with any of the nerves, nor will it result in a tendency to weaken the union of the wound. (Fig. 4.) Occasionally the separation of the internal oblique fibers will be at a point too low for the removal of a high-lying appendix, or, a cystic ovary or infected tube may be palpated just out of reach of the incision. In either instance there is a tendency in operating to make more room by cutting across the internal oblique muscle. A much better procedure, and one less likely to be followed by hernia, is to extend the incision in the external oblique muscle and make a new separation of the internal oblique fibers, either high up over the high-lying appendix or low down over the ovary and tube, as the case may require. We have frequently made several independent separations or splits in the internal oblique muscle, and in none of these cases has the abdominal wall been weakened. (Fig. 5.)

We rarely see postoperative hernia following a suprapubic incision for an operation on the bladder. However, when the hernia does occur the repair is difficult. For this reason, when operating upon the bladder, C. H. Mayo has, for the past ten years, made a transverse incision at a point about an inch and a half above the pubic bone. The sheaths of the recti muscles are cut transversely and dissected off from the bodies of the muscles an inch and a half each way. The muscles are then separated in the midline, but none of the fibers are cut. When the operation is completed in the bladder, the muscles are allowed to drop together, and the cut edges of the sheaths are united by sutures. (Bartlett's Filigree — Coffey's Expansion Operation.)

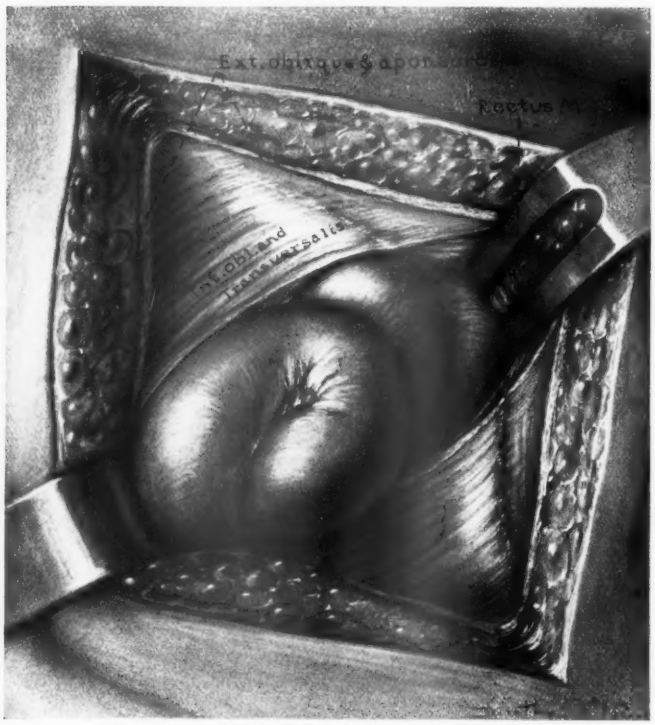


Fig. 4. The rectus muscle retracted to the midline.

Operation for the cure of ventral hernia has been practiced for many years, although it is only within recent years that the results have been to any degree satisfactory. Up to a few years ago, the percentage of recurrences as reported from the large clinics varied from 40 to 60 per cent, and they were, moreover, attended with a considerable mortality.

To remove all of the scar tissue and to close the gap in the abdominal wall by approximating the anatomic layers, respectively, would be the ideal method of repairing ventral hernia; but the mere fact that a hernia exists means that there has been a sloughing away or atrophy of a part of some one or all of these layers, and for this reason the anatomic closure should not be considered. Practicing this method in the past gave a high percentage of recurrences, and a mortality which, in all probability, was due to the sudden and marked increase of the intra-abdominal pressure caused by the reduction of the hernia and the diminution of the abdominal circumference by closure under extreme tension.

The majority of these hernias occur in fleshy people, and for many years it has been our custom to devote from two to six weeks' time, if necessary, in preparation for operation. The preparation consists in reducing the weight and getting rid of excessive fat. This is a help in two ways: First, in diminishing the amount of adipose tissue in the flaps to be utilized in the closure; and, second, in reducing the fat in the omentum and mesentery and thereby lessening the increase in intra-abdominal pressure at the time of reduction. In a great many instances we have been able to reduce the weight 25 pounds within four weeks by eliminating all carbohydrates and fats from the diet and giving a rather effective laxative once a day. During this preparation, which is usually carried on

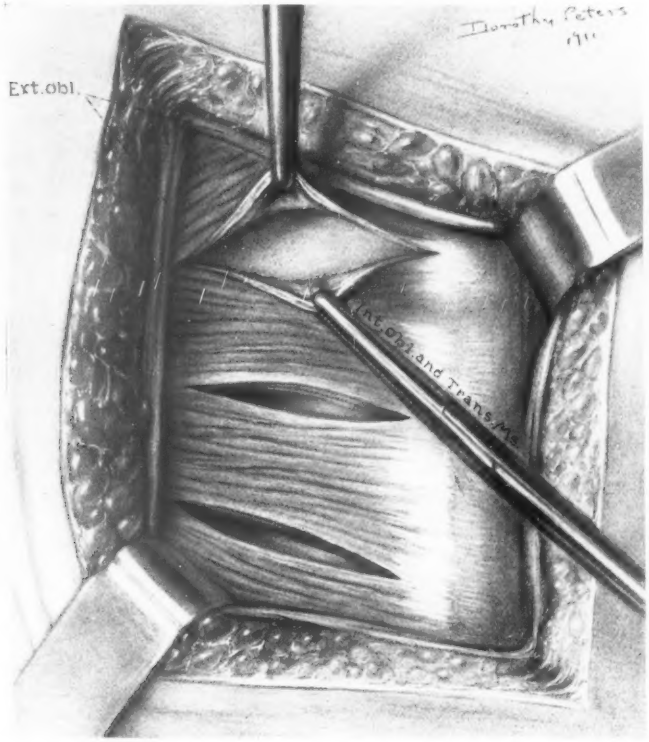


Fig. 5. Several split muscle incisions in internal oblique to avoid cutting its fibers at right angles.

at the patient's home, we give instructions to spend several hours each day in reducing or attempting to reduce the hernia. At times this may be accomplished by elevating the foot of the bed, and if the reduction can be brought about the patient is not subjected to the sudden increase of abdominal pressure at the time of operation. It is very important to bear in mind that the large pieces of omentum and coils of intestine which have been in the hernial sac outside the true abdominal cavity for a long period of time have lost their normal habitat in the abdomen, and that to force them back suddenly might cause very serious trouble.

In operating upon abdominal lesions we have observed repeatedly the rapidity and strength with which the peritoneum heals. (*a*) We know that we cannot drain the general abdominal cavity for more than a few hours by a foreign drain of any kind, because the foreign substance introduced into the abdominal cavity is very quickly walled off from the rest of the cavity by the union of the peritoneal coats of the abdominal organs. (*b*) An incision through the peritoneal surface of the bladder will invariably close up without urinary leakage, although a suprapubic incision not through the peritoneum though carefully sutured, will frequently drain urine for a time. (*c*) Until quite recently, it was believed to be necessary to sew the gall-bladder to the peritoneum when doing a cholecystostomy, in order to prevent the leakage of bile when the drain was removed. In recent years, it has been our custom to stitch a tube in the gall-bladder and allow it to drop back to its normal position, knowing that the tube would be completely surrounded by adhesions within a few hours from the rapidly healing perito-

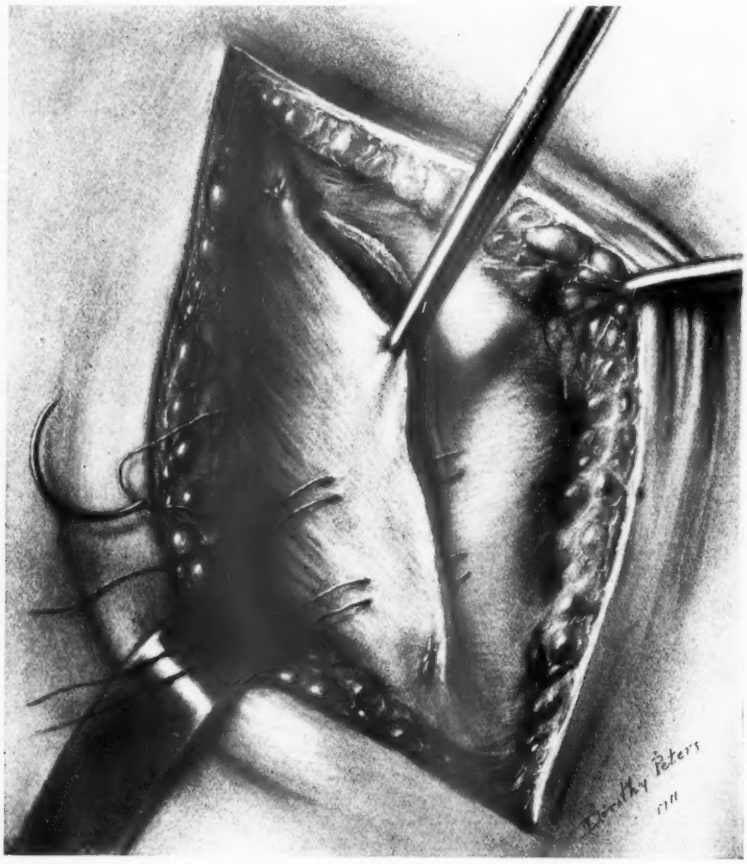


Fig. 6. Showing flaps composed of all the layers of abdominal wall and method of putting in mattress sutures.

neum, and in case the tube should come out, a complete sinus be made from the gall-bladder to the skin, which would carry the bile to the surface.

It was not until we fully appreciated the reparative powers of the peritoneum that we began to utilize it to the best advantage, and as an end to simplify the operative technic in repairing these hernias. For years, we have employed the principle of overlapping tissues wherever there was any difficulty in uniting wound edges, and until quite recently this overlapping was accomplished by flaps of fascia after the peritoneum had been closed. It was not an easy matter to dissect the peritoneum from the other tissues, and usually, by the time it was freed, each flap had been buttonholed and torn in several places, and they could not be closed with any degree of accuracy or strength.

Having observed the marked reparative power of the peritoneum in other locations, it follows naturally that we should adopt the simplest and easiest method to repair these hernias, that is, to make the autoplastic flaps of peritoneum, muscle, fascia, and scar tissue, as the case may be, and to overlap all of these layers as one flap on to a similar flap of the opposite side. In this way the peritoneum of one flap is approximated to the

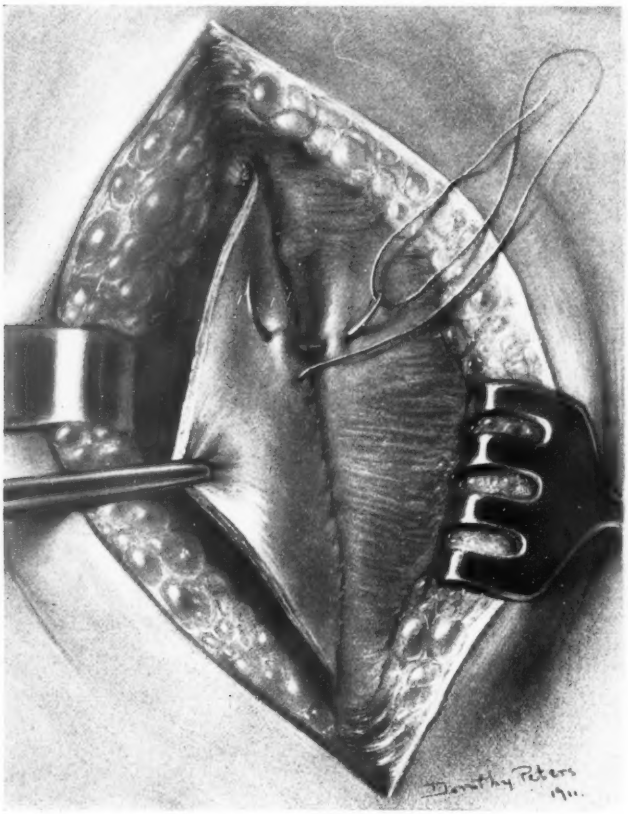


Fig. 7. Method of suturing peritoneal surface accurately to aponeurosis.

aponeurosis and scar tissue of the other flap. The method of choosing the flaps and the manner in which they are to be placed must depend upon the individual case. The overlapping may be from side-to-side, from above down with either flap outside, or it may be placed obliquely. This is a point which should be determined after the hernial contents have been reduced and the flaps measured.

The steps of the operation are as follows:

First: Removal of the old skin scar.

Second: Clearing the fat from the fascia for two inches in all directions.

Third: Dissecting the neck of the sac free from the aponeurosis.

Fourth: Opening the peritoneal sca and freeing the adhesions for at least an inch inside the hernial opening. Under no circumstances do we sacrifice any of the scar tissue or excessive tissue of any kind except the fat.

Fifth: We make no attempt to separate the flaps into anatomic layers. Choose the most convenient way of overlapping the flaps one upon the other, the peritoneal surface of one flap lying on the aponeurosis of the other. If the hernia is wide and gaping, several large mattress sutures of linen or chromic catgut are passed through the pedicle of one flap and the free edge of the opposite flap. (Fig. 6.) The peritoneal surface at the pedicle of the overlapping flap is then stitched accurately to the aponeurosis of the opposite flap. (Fig. 7.)

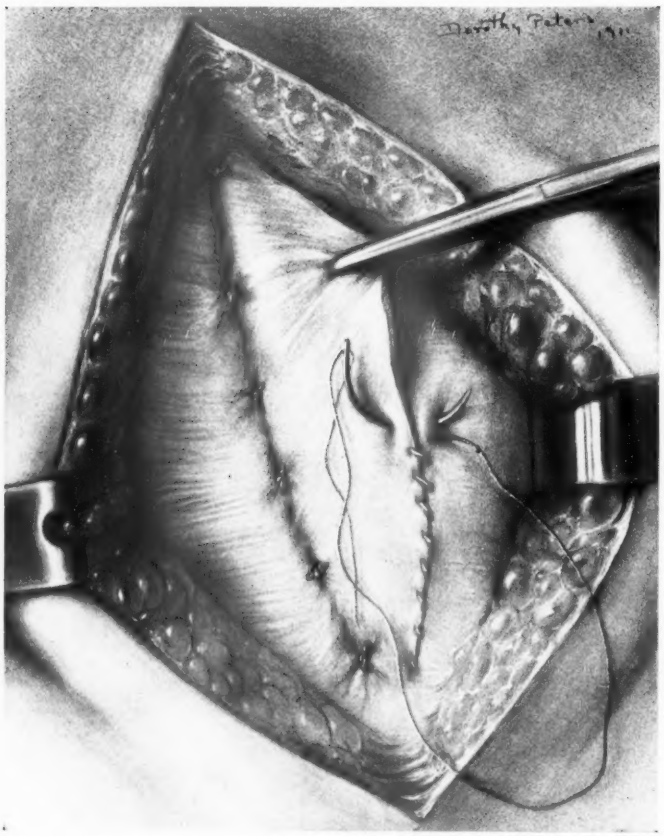


Fig. 8. Approximating the peritoneal surface of one flap to the aponeurosis of the opposite flap, and suturing free edge to aponeurosis.

Sixth: The free flap is now allowed to drop on to the aponeurosis of the opposite flap and is stitched accurately in place. (Fig. 8.) Very careful hemostasis is most essential. In case there is any serum or a great deal of fat, it is best to drain either through the end or through a stab drain.

During the past seventeen years we have operated upon 242 postoperative ventral hernias. One case died from acute dilatation of the heart on the second day. Thirteen are known to have had recurrence.

In the ordinary case, fifteen to eighteen days in bed give ample time for healing. It has been our custom to advise absolutely against wearing any truss or bandage which will make direct pressure upon the wound area. We do not believe that an appliance of this kind will prevent recurrence, but rather that it will have a tendency to push apart the flaps which we have imbricated, and that it would also, by pressure, interfere with proper circulation and healing in the tissues. However, we have found that most of these patients, especially the fleshy individuals, are made much more comfortable by wearing a general abdominal binder which does not make direct pressure at any point.

DEPARTMENT OF TECHNIQUE

A METHOD OF DEALING WITH THE SAC IN LARGE INGUINAL HERNIAS[1]

By HERMANN FISCHER, M. D., New York City, New York
Adjutant Surgeon German Hospital; Consulting Surgeon Rockaway Beach Hospital

IN the operation for large inguinal hernia of long standing, especially in cases where the patient has worn a truss for some time, we usually find a hernial sac which is very much thickened by chronic irritation either by pressure from the outside or by local peritonitic inflammation of the interior of the sac. In this class of cases we usually find the spermatic cord much split up and spread widely over the sac with all its structures, cremaster muscle, blood-vessels, vas deferens, tightly adherent to it. In dissecting off the sac by blunt or sharp dissection we always experience a good deal of bleeding and disagreable parenchymatous oozing so that it is difficult to get a dry wound which alone insures an uninterrupted repair. Besides the result is always a torn and very badly mussed up spermatic cord. I think that almost every surgeon has been confronted after such an operation in a certain number of cases with an hematoma which complicated and deferred healing and sometimes led to severe disturbances of a primary union, thereby endangering the ideal result.

In order to obviate these unpleasant occurrences I have worked out a plan to deal with these large sacs and have employed it regularly in my hernia operations for the last two years with perfect satisfaction.

As I have not read about the procedure and cannot find anything in the literature on the subject, I take the liberty to describe the same.

In the ordinary operation for hernia the sac is separated from the cord by blunt dissection, working at the outside of the sac with or without opening it. This is perfectly easy of accomplishment in small hernias of comparatively recent date.

In large and old hernias with thickened and tightly adherent sac I proceed as follows:

After cutting through the skin and having isolated the cord and the sac, the latter is primarily widely opened up to the inner ring. Its edges

are secured by artery forceps. The contents of the sac are dealt with according to conditions found and then returned into the abdomen. Now an incision is made at the inner aspect of the sac close to the internal ring, transversely to its long axis, care being taken to cut only through the inner peritoneal covering. One can easily avoid

[1] From the Surgical Division of the German Hospital, Dr. O. Kiliani, Attending Surgeon

the vessels and vas deferens which lie immediately below it, because they can be seen shining through this thin membrane. The peritoneal flap thus dissected off is secured with forceps and bluntly pushed off its underlying structures towards the abdominal cavity, which is very easily done as the inflammatory changes in the sac here are the least. Now the opening at the neck of the sac is carefully sutured taking care to go well beyond the internal ring. In order to do this it is necessary to retract the conjoined tendon well upward. After closing the opening the rest of the sac is peeled off from the cord, always working from within. It is surprising how easily this single layer is separated and how very few blood-vessels are injured. Sometimes there is no bleeding whatsoever. After having removed the sac the anatomical relations of the cord are hardly disturbed. The space left after removal of the sac is obliterated by the approximation of the structures of the cord, which fall together by themselves, a special suture is not necessary.

The facility with which this little modification is done and the small amount of traumatism it does to structures of the cord will undoubtedly appeal to the surgeons who make use of it.

EXCISION OF THE WHOLE SHAFT OF THE TIBIA; REPLACED BY TRANSPLANTING THE FIBULA

By GASTON TORRANCE, M. D., Birmingham, Alabama

A WHITE boy, six years of age, was admitted to St. Vincent's Hospital May 15, 1908, with the history of having struck his right leg with a hammer over the middle of the tibia; an abscess formed at the point of injury which was incised and curetted and healed up, but reopened and was operated again a few weeks later. Congenital syphilis was suspected but no history could be elicited to confirm this. Two grand aunts and all of their children died of tuberculosis. Family history otherwise negative. Tuberculin test negative.

Fig. 1. Drawing made from skiagraph taken before operation.

Fig. 2. Drawing made from skiagraph taken a week after operation.

Fig. 3. Drawing made from skiagraph taken five months after operation.

A considerable portion of the shaft had been chiseled out at different times, leaving a persistent sinus.

When he came under my care, about three months after admission, he was very much emaciated and ran a constant temperature.

A skiagraph showed the shaft of the tibia to be very much enlarged and in an unhealthy condition. Excision of the tibia was proposed.

Under ether an incision was made along the anterior border of the tibia and the bone was sawn in two with a Gigli saw, leaving about an inch of the bone at either end; the shaft was removed without any attempt being made to preserve the periosteum; the fibula was then sawn in two at the upper end and transplanted to the stump of the tibia and was held in place by suturing the muscles up snugly around it.

The leg was placed in a wire splint. A skiagraph, made a week later, showed the fibula to be in good position. His general condition began to improve at once. He was allowed to be up on crutches at the end of four weeks and was in good physical condition.

Two months after operation, two large ulcers developed near the point of the original injury and grew larger and deeper under local treatment.

He was put on potassium iodide and the dose rapidly increased to forty drops of the saturated solution three times daily. He bore this treatment well and the ulcers rapidly healed.

Fig. 4. Skiagraph made three years after the first operation and a little over two years after the operation on the lower end of the fibula.

On questioning the father again at this time

Fig. 5. Photograph taken when the last skiagraph was made.

he admitted that the child had contracted syphilis from kissing a male relative at two years of age and had been treated for about a year.

He developed an iritis about seven months after operation, which cleared up with large doses of the iodides.

A skiagraph, made five months after operation, showed that the fibula had about doubled in size and that the union with the tibia was rounded off resembling a joint "wiped" by a plumber.

A few weeks after this he was shown before the Alabama State Association, and was walking on the limb without a splint or crutch, the only difficulty he experienced was a slight tilting of the ankle.

The lower end of the fibula was transplanted ten months after the first operation. He was allowed to walk about on crutches for two months and then lateral splints were applied and he was allowed to put some weight on the leg.

He was lost sight of for about a year and a half and was again seen in August, 1911, when the photograph and the last skiagraph were made.

The muscles of the leg are well developed and there is no shortening; while the skiagraph shows some bowing of the shaft, the general lines of the leg are almost perfect and when standing with long stockings on it is not possible to tell which is the operated leg.

He runs, jumps, and plays with the other children and has perfect use of the limb.

NON-DESCENT OF THE TESTIS AND ITS RATIONAL REPLACEMENT

By ROYALE HAMILTON FOWLER, M. D., Brooklyn, New York
Assistant Surgeon German and Seney Hospitals

THE result of operation in cases of non-descent of the testis depends entirely upon the success or failure to secure lengthening of the cord. No matter what the operation may be this is the essential feature to be observed. The Bevan operation is certainly applicable to the majority of cases either with or without the section of the spermatic vessels. In some cases of ectopic testicle however it would appear that it is not only the vessels of the cord which oppose replacement in the scrotum but the vas deferens in addition. It will be recalled that in the Bevan operation the vessels of the cord as they course downward and the vas as it courses upward are freed each in its own direction. This procedure is usually sufficient in an inguinal ectopic testis, section of the vessels of the cord leaving the artery of the vas intact to carry on the nutrition of the testicle will at times suffice to allow satisfactory replacement of an abdominally displaced organ. The lengthening obtained in this way amounts to one to three inches. This latter method however may not allow sufficient lengthening due to the shortened vas. It is to such rather rare conditions that an operation devised by the late George Ryerson Fowler is applicable. The thought of applying the procedure to this condition other than that for which it was originally devised occurred to me several months ago. I have since learned that the late Dr. Alexander Hugh Ferguson of Chicago has already applied this operation to non-descent of the testicle. I refer to the technique the late Dr. Fowler employed in cases of old hernia with

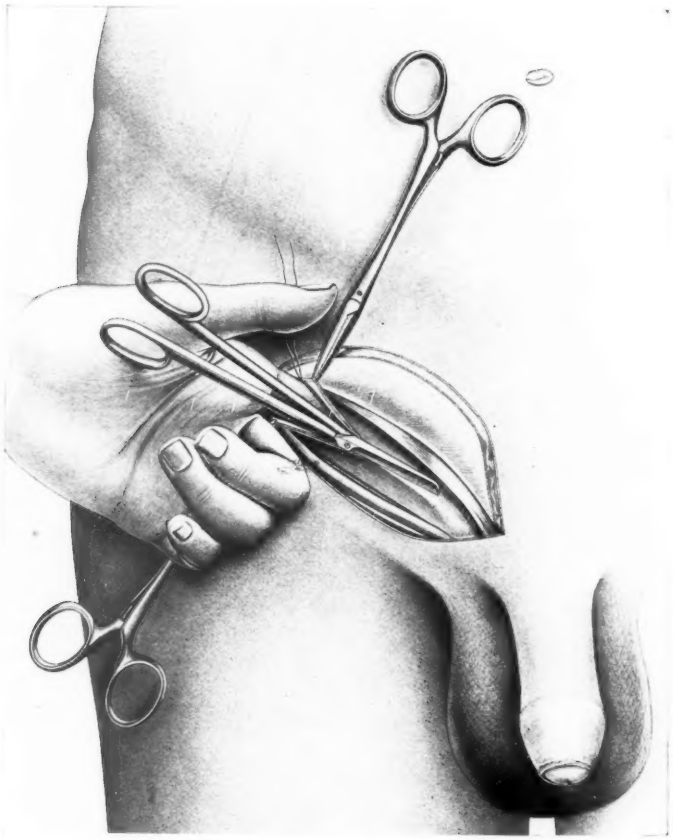


Fig. 1. Introduction of finger into abdominal cavity under floor of inguinal canal. The deep epigastric is doubly ligated.

a lax internal ring. This was described by him in 1897 (New York Polyclinic, July) and had for its object the simultaneous obliteration of the internal ring and inguinal canal and the formation of a new internal ring effected by intra-abdominal transplantation of the cord. This is accomplished as follows: After the inguinal canal is exposed as in the Bassini operation, cord identified, sac separated, incised, contents reduced, sac ligated and excised, the index finger is introduced into the internal ring, palmar surface upward. The deep epigastric vessels are identified at the point where they cross the floor of the canal and doubly ligated. An incision is then made in the posterior wall of the canal upon the finger as a guide from the internal ring to a point well below the level of the pubic bone. The cord is freed, allowed to drop back in the abdominal cavity except for the distal extremity which is permitted to emerge at the lower angle of the incision. Through and through sutures approximate the edges of the incision made in the posterior wall of the canal, serosa to serosa. An opening is left at the lower angle which forms the new internal ring and is placed sufficiently low to compel the cord to curve upward in order to cross the pubic bone. This strengthens an otherwise weak point by forming a bony buttress anteriorly. The highest sutures are placed well above the internal ring which is to be obliterated. In this line of sutures the mattress is the type most advantageously applied. The operation may now be completed after the manner of Bassini. The two lower deep sutures to the shelf of Pou-

Fig. 2. Formation of new internal ring, posterior wall of canal approximated with mattress sutures.

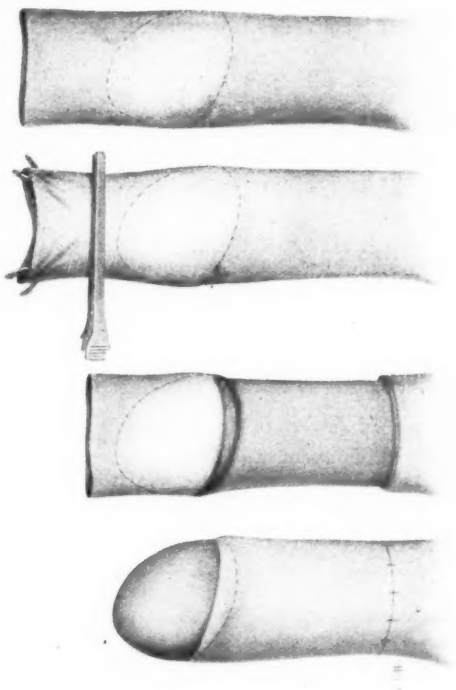
part's should include the rectus or pyramidalis muscles.

To my knowledge the late Dr. Ferguson was the first to apply this method in this new connection. In his admirable work upon "Modern Operations for Hernia" recently published he states: "I have used this operation or a modification of it forty-five times, usually in cases in which the hernia was complicated by a non-descent of the testis. It gives the vas deferens a shorter route between the testis and the base of the bladder. In certain conditions it is not necessary to cut the peritoneum although the deep epigastric vessels are severed."

A NEW METHOD OF CIRCUMCISION

By E. GARD EDWARDS, M. D., La Junta, Colorado

THE writer has been more and more impressed, after examining cases of circumcision, work of his own as well as others, with the fact that there is probably no operation in minor surgery so often illy done, as shown by the cosmetic results, as this frequent and necessary procedure. Numerous cases have come to my notice where the after result has been, aside from the exposure of the glans, infinitely worse, cosmetically considered, than the original condition. Most frequently one will find this in a superabundance of tissue on the under surface of the penis, giving a baggy appearance at that point; almost always a marked scar and frequently fibrous tissue in the line of the incision. The first named condition is of course due to the failure to trim away the requisite amount of tissue at the time of operation, and the latter to the frequent result of the healing of any skin incision. To overcome this, I have been in the habit of using the following procedure, which, so far as I know, is original and hence for this reason described, but which has the disadvantage of being somewhat limited in its application, as it is possible to use it on one class of cases only, viz., those with a redundant foreskin that can be fully retracted but which, by reason of its excessive length, should be removed.



The operation is done as follows: With two catch forceps grasp the foreskin anteriorly and posteriorly, drawing it well down. At this point, with the tissues on the stretch, pull down the skin still further with the forceps, being careful to grasp only the skin. Place the straight phimosis clamp at a slight angle on the foreskin, having decided beforehand the amount necessary to be removed in order to expose the glans to the posterior third (one need only remember that the resulting loss of tissue will be twice the apparent width ahead of the clamp). The tissue to be removed, as one will readily perceive, is skin only. When the clamp is removed and the skin retracted there will be a circle of skin taken from the posterior third of the penis. Draw the edges of the cut surfaces together; stitch with subcutaneous or interrupted sutures; cut frenum if necessary.

The result: The skin at this point, if squarely cut, and intimately approximated, will heal with but a faint line showing; this will be well back on the posterior portion of the penis and the foreskin will have all the smoothness of nature. The hæmorrhage amounts to a few drops only. No anæsthetic is required other than a few drops of cocaine injected ahead of the clamp. Danger of infection is practically nil. The incision made at this point will not cause swelling of the tissues and it is much easier to keep dressings applied.

THE MODIFIED McBURNEY INCISION

By ROYALE HAMILTON FOWLER, M. D., Brooklyn, New York
Assistant Surgeon, German and Seney Hospitals

THE majority of surgeons make an adequate incision which permits the entrance of the hand and thorough examination of the abdominal contents. There are many who do not do this as routine and it is with the hope that the description of the technique advocated below may appeal to this class that the present communication is written. It was formerly the pride of operators to work through as small an opening as possible with the result that many lesions remained unidentified. There was also a time which followed this period when the pendulum swung in the opposite direction to an extreme and the patients were unnecessarily incised from ensiform to pubes.

The object of this modification of the McBurney incision is to afford free access to the right iliac region and adnexal lesions of the uterus. The Lane kink may be very satisfactorily studied through this opening. This improved method of entering the abdominal cavity was first described to the profession by my father, the late George Ryerson Fowler, in June, 1899, when he presented a paper upon the subject before the, Associated Physicians of Long Island. In March the technique was described in the Medical News. One month before this Dr. Robert Weir described a similar procedure in the same journal. The technique has since been known as the "Weir Extension" and the "Fowler Incision." The original method described by the late Dr. Fowler is as follows: A curved incision is made, the center of which is situated somewhat to the outer side of McBurney's point. Following the division of the external oblique aponeurosis (Fig. 1) in the direction of its fibers, this is retracted to expose the rectus sheath. The rectus sheath is then divided parallel with the muscular fibers for a distance of one or two inches. (Fig. 2. The inner margin of the external oblique should be retracted in the illustration.) This incision exposes the rectus muscle, the belly of which is drawn toward the median line. (Fig. 3) The fibers of the internal oblique are then split to the incision in the rectus sheath. The completed opening is shown in Fig. 4.

Fig. 1. The aponeurosis of the external oblique exposed. The dotted line shows the place of the incision in this structure.

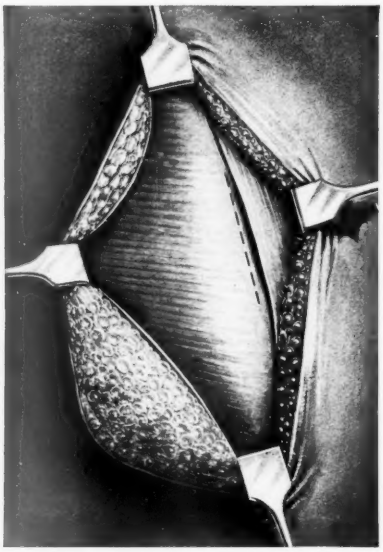


Fig. 2. The dotted line shows the site of the incision in the sheath of the rectus muscle.

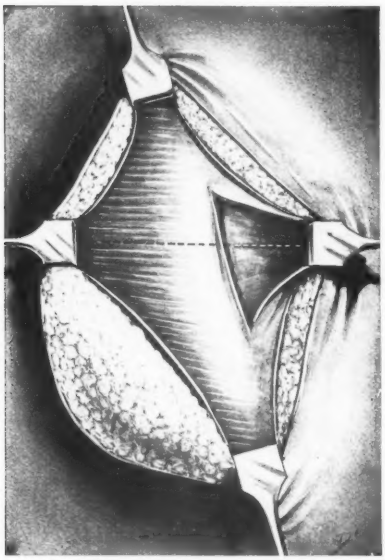


Fig. 3. The site of the transverse incision.

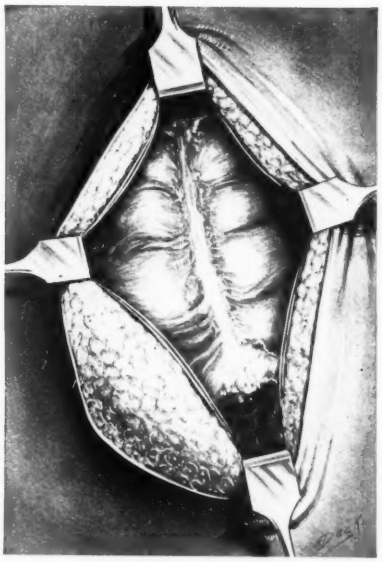


Fig. 4. The opening in the abdomen.

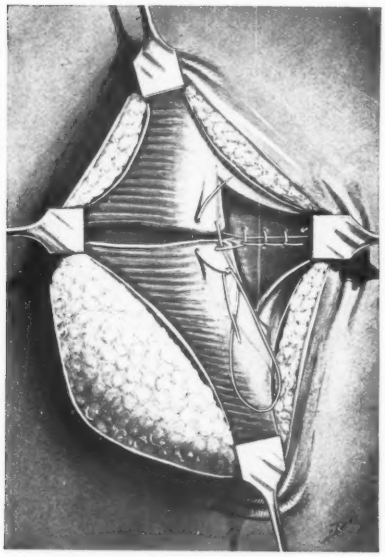


Fig. 5. Suturing the transverse incision.

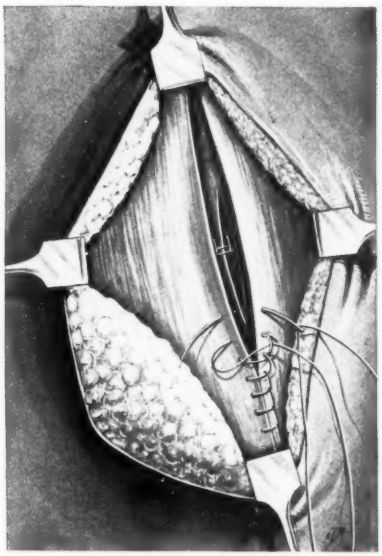


Fig. 6. Suturing the incision in the aponeurosis of the external oblique.

Closure is effected as illustrated, (Fig. 5) the opening in the anterior portion of the sheath may be conveniently closed by including it in the suture used to approximate the external oblique. (Fig. 6.)

This technique was repeatedly demonstrated by the late Dr. Fowler to the classes at the New York Polyclinic as well as to those attending his other hospital clinics and used with the utmost satisfaction. The incision has been used by Dr. Russell S. Fowler, myself, and others, with entirely good results.

AN IMPROVED METHOD OF FIXATION OF COLON

By F. GREGORY CONNELL, M. D., Oshkosh, Wisconsin

REALIZING the danger of a possible obstruction of the bowel as a result of the method of fixing the colon by means of the pericolic membrane, that I described in an article entitled "Ileo-cecal Adhesions," that appeared in Surgery, Gynecology and Obstetrics of November, 1911, I have employed and would recommend a technical modification in which such a potential danger of ileus is removed.

The method of separating the Jackson's membrane, and its formation into a cord that is attached to the colon or cecum is the same as previously described; but instead of its inclusion in the abdominal incision, it is passed from a point within and behind, in the line of the dorsal insertion of the mesocolon, or the blending of the parietal and visceral peritoneum in an upward and forward direction between the muscle and fascia, in an extra peritoneal course—in a way,

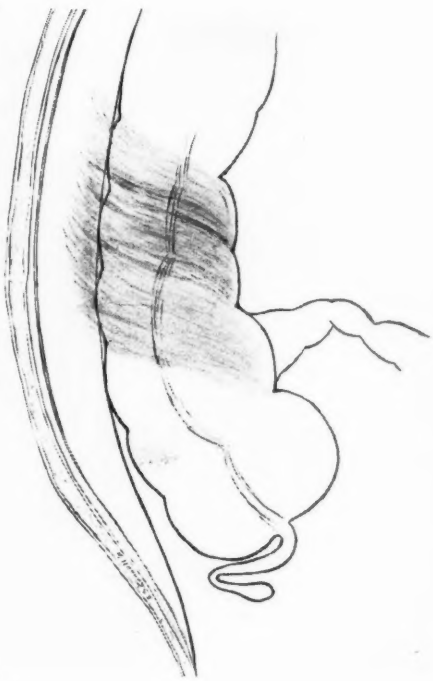


Fig. 1.

Fig. 2.

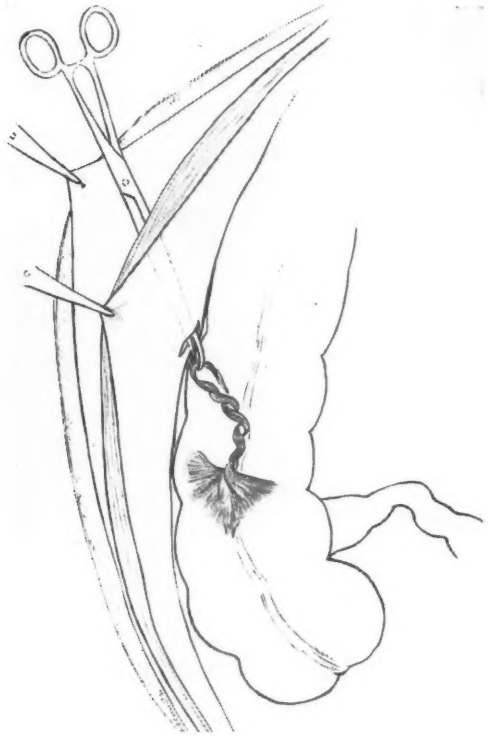


Fig. 3.

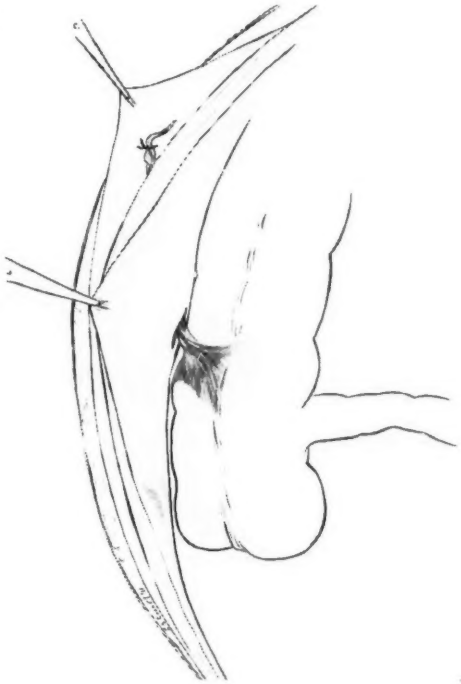


Fig. 4.

similar to the intra-mural shortening of the round ligaments.

In order to secure this result, curved forceps are inserted between the fascia and the muscle on the right side of the abdominal wound, and are passed laterally and dorsally in the abdominal wall, and made to present within the abdominal cavity by puncture of the parietal peritoneum at a point above and behind the origin of the artificial ligament from the bowel. The jaw of the forcep is opened and the free end of the ligament grasped and pulled through the abdominal wall, as the forcep is withdrawn; the end is then attached to the fascia. (This maneuver is shown in figures 1, 2, 3, and 4, sketched from actual case.)

This procedure has been repeatedly carried out clinically and is practicable, and can be recommended in cases where the pericolic membrane is of such a character as to make it applicable.

Other methods of performing fixation of the colon, with the indications for and against such an operation, will not be considered at this time, the object of this short communication being merely the recommendation of an improvement of the method described in my previous article, already referred to.

A NEW AXIS TRACTION HANDLE

By JAMES W. FARRIOR, Philadelphia, Pennsylvania
Fourth-Year Medical Student, University of Pennsylvania

THE most popular types of axis traction forceps, as represented by the Tarnier, Milne-Murray, Simpson, Breus, and a few others, owe their effectiveness to steel rods which are fastened by a hinge-joint to the blades of a pair of long forceps. The Poulet differs from these in that the rods are replaced by tape, which can not be as strong and is equally liable to cause laceration of the perineum. The Sänger forceps has leather thongs which pass from an attachment to the blades, through a rubber ring around the handle, to the hand of the operator. The Dewees, which has recently come out, has neither rods nor tape, but is not adapted to anything except axis traction work, and is therefore not adapted to the later stages of a forceps delivery.

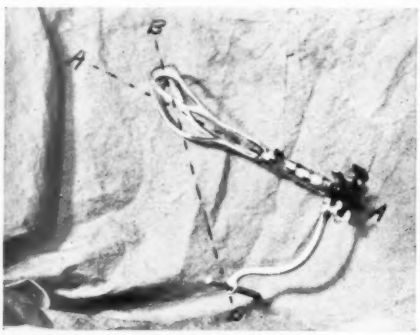
My axis traction handle can be attached to any forceps, converting them into as perfect axis traction forceps as any on the market; provided, of course, they have a sufficient pelvic curve and are long enough. There are no hinges within the birth canal nor are there any extra parts, as rods or tape. The new instrument is small and occupies less space in the obstetrical bag than any axis traction forceps. It is easily and quickly applied or removed.

The handle shown in the illustration was made by Charles Lentz & Sons, Philadelphia. Since an axis traction forceps is not intended for work within the birth canal, and a forceps of the ordinary pattern is in every obstetrician's bag anyway, this attachment replaces an expensive special forceps, at a small cost.

In almost any of the axis traction forceps, breaking of the instrument might result in a laceration of greater or less severity, and the rods or tape, present in all except the Dewees, often injure the perineum in spite of care to prevent it.

When using the axis traction handle with a forceps for the first time, the handle should be fastened at such a point on the forceps that the arrow near the grip of the traction handle, which is not visible in the cut, will point approximately at the center of the child's head when the forceps are being used. This point may be marked or merely noted, as the exact angle in any individual case can not be known. The traction handle is to be fastened on after the forceps have been applied and should be at the point as determined above. The top thumb screw is unscrewed so that the forceps handles may be placed between the knurled surfaces and, having closed the forceps so as to grip the child's head, is then screwed down firmly. This locks the forceps on the child's head and fastens the traction handle rigidly to the forceps. Next loosen the lower screw and the handle can be rotated approximately about the axis of the forceps so as to allow for the oblique positions of the head. As soon as the head has been drawn through the superior strait and the axis traction instrument becomes useless, or worse than useless, the top screw can be loosened and the traction handle removed. The removal is not necessary, however, for the rigid attachment would prevent annoyance and possible injury from a swinging part.

It is easily seen that the pull is in the right direction. Fastened firmly to the forceps, the traction handle becomes one with them so far as the transmission of force is concerned. In the



ideal case, only two forces would exist in the delivery: first, the resistance of the superior strait to the entering head, which would be in the direction of the birth canal at this point; and, second, the force applied by the operator. Since the direction of the canal at this point is at an angle of 55 degrees to the axis of the trunk, the line of force must be in this direction if there is to be no impinging of the head on the bony rim of the superior strait. Having applied the forceps and attached the traction handle, if the line from the grip of the latter to the head of the child corresponds to the 55 degree line, then force applied along this line will be opposed only by the resistance of the superior strait to the entrance of the head. The dotted line AA in the cut shows the direction of the forces that are applied to the handle of the forceps, while the line BB shows the direction of the force that is applied to the traction handle. In a delivery it is essential that no tissue should intercept the line of force transmission. The soft parts and the sacrum lie in this line, but the curve of the handle avoids them.

A proper entrance of the head would result in a minimum of injury to both the mother and the child and would make the operation as easy as possible.

The designer wishes to express his thanks and appreciation for the advice and kind criticisms of Dr. B. C. Hirst.

NITROUS OXIDE AND OXYGEN ANÆSTHESIA AND A NEW APPARATUS[1]

By F. J. COTTON, A. M., M. D., and WALTER M. BOOTHBY, A. M., M. D., Boston, Massachusetts

FROM THE SURGEON'S POINT OF VIEW

F. J. Cotton

FOR many months past I have had a disquieting consciousness of the number of cases that showed postoperative complications — mainly pulmonary — not often fatal, but very distressing at best.

In this community we have all sucked in, as our first surgical nutriment, the safe, sane, and almost holy character of ether as an anæsthetic.

It is hard to change early conviction, but observed facts must call for first place in our consideration, and I confess that the ether results of my last few years, in both public and private hospitals, have given me much concern.

Only three deaths in the series are fairly chargeable to ether, one a prompt death in a child, dead within 36 hours of "inhalation pneumonia," two in young men who died of lobar pneumonia after appendix operations.

But I have grown to feel that perhaps even a majority of the postoperative complications (pulmonary, in the main) have a connection with the anæsthetic.

Caused by ether or not, in the strict sense, they would not have occurred had the patient not been etherized.

Consequently, I was greatly interested in the reports of Dr. George Crile of Cleveland, in those of Dr. Gatch in Baltimore, Dr. Gwathmy of New York, and others, concerning the ease and safety of administration of nitrous-oxide gas properly administered with an admixture of oxygen and of a minimal amount of vaporized ether.

I made arrangements for a trip to Cleveland, to learn.

Shortly after this, I saw given here in Boston a demonstration of nitrous oxide and oxygen anæsthesia that was very discouraging from the operative point of view, because of the utter failure of all attempts to secure that measure of muscular relaxation on which so much of our operative procedure (particularly within the abdomen) depends.

Undeterred by this set-back, I went to Cleveland and found Crile working with nitrous oxide

[1] Received for publication, August 22, 1911.

and oxygen as a routine method, working along through a large daily average of surgical cases (major surgery, as a rule) with a comfortable disregard of the anæsthetic procedure that was a revelation to me.

Crile depends for his anæsthesia on one anæsthetist, Miss Hodgins, a nurse in whose training the Boston City Hospital may claim an early share. She has been an anæsthetist for some time, and for this special work she spent a half-year or so in the laboratory, learning what one may learn through physiological experimental work in anæsthesia. To-day she is probably the ablest anæsthetist, so far as nitrous oxide goes, in the country.

During a stay of several days in the Lakeside clinic, illuminated with Dr. Crile's physiological knowledge and Miss Hodgins' clinical experience, I became thoroughly convinced of the practicability of their methods.

They have about 2,000 cases to date[1] without an instance of postoperative complications in any way referable to the anæsthetic.

I came away from Cleveland thoroughly convinced:—

(a) that nitrous oxide (with oxygen) is safer than ether, as ether is ordinarily given,

(b) that this anæsthesia in some fashion lessens what we call "shock,"

(c) that it is far preferable, from the patient's point of view, both because of the less degree of postoperative depression, and because of the less frequency and intensity of nausea, and the elimination of the distressing ether taste and smell that are so often complained of.

On my return to Boston I had formulated certain conditions for a gas-oxygen machine — conditions of safety, of precision if you like, and I did not feel that any apparatus I could find fulfilled those conditions with any exactness,[2] though several machines are practically useful in the hands of expert anæsthetists.

Accordingly I turned over to Dr. Boothby, my private assistant, the problem as it presented itself to me.

I was fortunate in that he is a skilled etherizer and has had a clinical experience with nitrous oxide (alone) far beyond my own.

The problem placed before him was to devise an apparatus which should furnish nitrous oxide and oxygen:

(a) with an apparatus in which rebreathing may be used to any desired extent, or may be dispensed with at will,

(b) with an apparatus that gives accurate control and registration of *quantity* and *pressure* of gas supply of both nitrous oxide and oxygen,

(c) with an apparatus that is capable of giving a steady supply, not influenced by the intermittent freezing-up of valves,

(d) with adequate appliances for mixing, warming, and moistening the gases,

(e) with an apparatus not dependent for its efficiency upon a considerable positive pressure of the gases furnished for respiration,

(f) with provision for use of air with vaporized ether — that is, with an air pump. This is occasionally called for when nitrous oxide and oxygen do not work quite well, but is important particularly with relation to intra-tracheal-insufflation anæsthesia, — a mode of anæsthesia destined, I believe, to play a large rôle in the future.

I believe the question of *low pressure administration* with a *controllable supply* of gases very important, and I do not believe it practicable to secure such a control unless we have an *automatic* apparatus for reduction of pressure of the gas feed.

The ability to work at low pressure is important, to my mind, because marked positive pressure within the feed-tubes and mask have seemed to me (from observation) necessarily linked with the early onset of the embarrassed respiration later referred to as the "expiratory accent" reflex.

We must have a *slight* positive pressure, but it need only be a very slight pressure. In our early cases it was almost zero; later we found that a little pressure (a light spring set against the exhaust valve of the mask) gave a pressure too slight to give trouble but enough to save gas and dollars.

We need, then, first and foremost, *automatic reducing valves* and some means of preventing freezing-up of the valves[3] before we can work with anything like exactness of control.

The extent to which rebreathing is advisable as a routine is still *sub judice* I think,[4] but some rebreathing is often advisable, and, as we shall see

[1] In Dr. Crile's paper in Surgery, Gynecology and Obstetrics for August, 1911, he gives the present total as 2,412.

[2] In Crile's clinic the nitrous oxide is fed not from the cylinder but from a cellar-manufactory, at 25 pounds pressure, and under these circumstances there is no chance of valve-freezing or excessive pressure in the mask. The success of this method is therefore no test of what can be done with the Teter apparatus as originally devised.

[3] The volatilization of liquid nitrous oxide (at about 700 pounds pressure) to the gas at low pressure consumes so much heat that the top of the cylinder coats with snow and the valve freezes tight from time to time under ordinary conditions of use, unless some heating device is employed.

[4] There is no question that rebreathing may safely be made a means to economy in dollars: here I am speaking only of its relation to ideal anæsthesia.

later, forced rebreathing for a time often becomes advisable, so it is obviously worth while to have apparatus so devised as to allow rebreathing, accurately controlled, to any desired extent.

The desirability of warming and moistening the mixed gases seems obvious. These gases seem devoid of any intrinsic irritant effect on the lung, but one hardly cares to risk the breathing of *any* gas at the very low temperature produced by volatilization.

The designing of the apparatus we are using and the supervision of its construction were attended to by Dr. Boothby with my collaboration, and I am going to let him tell about it. Personally I believe the result to be the completest and best hospital apparatus yet devised. He is now engaged in devising a portable apparatus.

I am going also to leave to him the discussion of details of administration, for he has devoted himself for three months past to acquiring technique until we have reached a point where some one else can be taught what he has worked out, but there are some points I wish to mention.

Really skilful gas-oxygen anæsthesia is an expert's art, and as with other arts much of the skill involved is personal, not to be exactly set down in terms.

We have worked on the theory that nitrous oxide is a *specific anæsthetic* (i. e., asphyxia *should* have no part to play in the production and maintenance of unconsciousness).

Nitrous oxide enough is given to produce unconsciousness.

Oxygen enough is given with it (continuously and evenly) to secure proper aeration of the blood: the color of the face is the only guide.

Ether is to be used only to secure absolute relaxation and even breathing, when this end cannot be secured otherwise.

Failure to obtain smooth respiration seems often to be accepted as inevitable in gas anæsthesia, but it is not.

From Crile I learned to watch for the *accented expiration*, a curious straining effort during the *expiratory* phase *alone*.

This sort of respiration is exaggerated by even a slight increase of pressure within the mask and feed-tube, but I believe it to be a sign of nitrous oxide saturation simply. It differs entirely from the forced respiration (with the accent rather inspiratory) of deficient aeration, and is *not* relieved by adding oxygen enough to produce a pink color: of course, a *large* excess of oxygen so dilutes the gas as to give some result.

The sign of too much nitrous oxide is, then, the accented straining expiration: when this occurs, a less supply of nitrous oxide (with the oxygen supply constant) promptly remedies the condition, and if a very little ether vapor is used at this time respiration again becomes smooth without the patient coming out: then we can return to the gas-oxygen alone.

Boothby has advanced a theory that I think will prove to be of great practical importance: he maintains that if the depth and rate of respirations be increased more nitrous oxide will be brought into contact with the blood in the alveolar capillaries; he further shows that this increase in total volume of respired gases will allow him to decrease the percentage of oxygen in the mixture and yet have a perfect oxygenation of the blood. He brings this increase about by rebreathing and by the addition of minute quantities of ether.

So we have (1) less nitrous oxide, (2) more ether, (3) rebreathing, by means of any of which manœuvers we can promptly influence the character of respiration.

Properly given gas-oxygen gives a muscular relaxation that is less limp than occurs under ether, but is amply sufficient for even delicate abdominal operating.

The operator accustoms himself to the slightly different conditions without trouble, and I can truthfully say I have had no inconvenience in any case so far from lack of relaxation.

The question of the operator's comfort depends simply on having the gas properly given.

Another alleged difficulty, likewise avoided by proper technique, is that of venous congestion and consequent hæmorrhage. I myself have seen nitrous oxide so given in one case (jaw necrosis) that there was extreme cyanosis throughout the operation, and venous hæmorrhage in consequence in an amount that not only totally obscured the operative field, but was in itself alarming. There is no need of this sort of thing — it is purely a question of proper apparatus and technique.[1]

Personally I am nervous in watching nitrous oxide so given that marked cyanosis results. Apparently the danger is slight at worst, but certainly even momentary checking of respiration and of access of oxygen to the lung gives sharp cyanosis. The proportion of oxygen given is small and its supply should be continuous, it seems to me, in order to keep well outside the danger zone.

With gas-oxygen properly given the patient is *pink* — with a better color than under ordinary ether conditions. If he is not pink, then I want

[1] In one case I had a hæmorrhage — but this was from sudden choking, due to falling of the tongue. The tongue was quickly gotten out of the way, but the resultant vein distension tore loose a lateral tie on the jugular vein that had to be renewed.

to know why! If he is pink and the muscles of his face have expression (that is, tone) I am perfectly unconcerned about his welfare.

The only excuse for *any* cyanosis is the occasional vomiting, rarely seen as the patient is coming out, oftener occurring if the anæsthesia is too deep.

It may be said here that the skilled administrator quickly finds the proportion of gases and the rate of feed required in the given case, and after this is established little need be done as a rule. Often I have seen anæsthesia go on for 15 or 20 minutes without the anæsthetist touching a valve.

The total experience with gas-oxygen is now large enough to demonstrate that the method is safe, that it is comfortable to the patient in administration, and that recovery from it is far more comfortable than with ether.

The advantages from the patient's point of view are coming to be recognized, though I do not think the lessening of shock and of post-anæsthetic nerve depression are yet fully appreciated.

On the other hand many surgeons oppose its use because of the supposed difficulty in maintaining comfortable operative conditions.

I want to emphasize and reiterate that there is no such difficulty to-day if the anæsthetic is properly handled.[1]

For such handling we need not only an expert anæsthetist, but an apparatus so constructed that he can work with precision.

We believe this problem to have been rather well solved in the apparatus here presented.

[1] It is to be understood that preliminary use of morphine with atropin or scopolamin is essential to smooth results in unpromising subjects.

FROM THE ANÆSTHETIST'S POINT OF VIEW

WALTER M. BOOTHBY

Horace Wells, of Hartford, Connecticut, in December, 1844, or January, 1845, on the invitation of Professor John Collins Warren, addressed the latter's class in surgery at the Harvard Medical School on the subject of rendering the body insensible to pain for the performance of dental and surgical operations; some few days later Wells attempted a public exhibition of the possibility of extracting a tooth without pain while the patient was under the effect of "exhilarating gas." Although the attempt was not entirely successful, yet it is worthy of commemoration, as this trial antedated the demonstration of the anæsthetic properties of ether made by Morton at the Massachusetts General Hospital in 1846 by nearly two years.[1]

Since then intermittent interest has been shown in the use of the gas for dental and surgical purposes; its use for surgery, however, really dates from 1868 when Professor Andrews of Chicago demonstrated that if nitrous oxide was mixed with the proper percentage of pure oxygen a *prolonged* anæsthesia was possible.

A study of the many and varied forms of apparatus designed for the administration of nitrous oxide and oxygen shows that the main difficulty militating against the general use of the anæsthetic has been a mechanical problem.

Several attempts have been recently made in Boston to popularize this anæsthetic, but without success; in fact they have created a marked prejudice against nitrous oxide and oxygen because they have apparently shown that surgical relaxation is very difficult and often even impossible. I was a witness of some of these attempts and further have had a considerable experience in the use of nitrous oxide preliminary to ether. Personally I am convinced that I would be unable as a rule to maintain a smooth anæsthesia without rigidity, stertor, and cyanosis, with any of the appliances ordinarily used. My ground for this conviction is as follows:

1. Nitrous oxide under a pressure of about 700 pounds to the square inch is a liquid.

2. It is impossible to obtain and regulate a smooth and constant flow of gas from such a compressed liquid by the means of a hand valve acting directly against the pressure; and, in addition, this difficulty is increased by the intense cold produced by the expansion of the liquid into a gas, which freezes the valves and interrupts the flow of the gas.

3. The oxygen as generally used is, when the tanks are full, under about 1,800 pounds pressure to the square inch; truly an excessive pressure from which to attempt to regulate by hand and administer it in small and varying amounts to a human being.

4. No apparatus supplies any means of estimating the proportion and amount of each gas being used.

5. No apparatus has an efficient ether chamber from which either a weak or a strong proportion of ether vapor can be obtained.

[1] For a historical review of the use of nitrous oxide, with references, see Boothby: 1911 Transactions of the Massachusetts Medical Society:

6. Some forms of apparatus in an attempt to warm the vapors make use of an alcohol lamp; this appears to me a very dangerous procedure, as a mixture of oxygen and ether is not only inflammable but also highly explosive.

When Dr. Cotton suggested to me the advisability of designing an apparatus to overcome these difficulties I felt that many would be insurmountable. However with perseverance we have, I think, evolved a practical apparatus that more than covers the points mentioned.

Although at first glance this machine looks complicated it is not so in reality, for during an operation all the anæsthetist has to do is to *occasionally* turn the oxygen, ether, or nitrous oxide valve; the rest is automatic.

With the details and original difficulties of design I will not detain you; however, I must enlarge upon the following essential points:

1. By means of automatic reducing valves the high pressure of both nitrous oxide and oxygen are reduced to a working pressure of about twenty pounds; from this pressure it is possible to obtain, by means of an accurate hand valve, an even flow of gas at any rate desired.

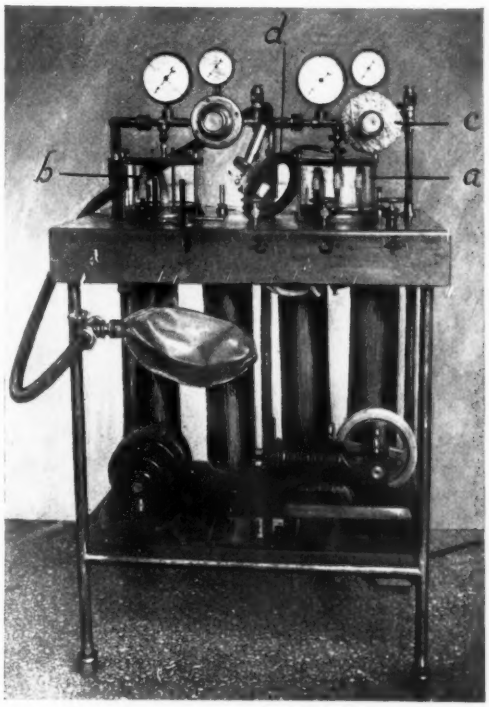
2. To prevent the freezing of the automatic valve connected with the nitrous oxide tank a very small electric heater of special design is applied to its posterior surface.

3. To provide a means of readily estimating the absolute amount of each gas being used and therefore the proportions of the two gases being inhaled, they are made to bubble through water into a mixing chamber.

4. For the addition of the amount of ether vapor requisite for any given case there is arranged an ether chamber of ample dimensions. The gases after leaving the mixing chamber pass through a three-way exit valve by means of which they may be allowed to pass around the ether chamber or they may be made to either partly or entirely pass over the surface of the ether or they can, in case of necessity, be forced to bubble *through* the ether.

5. *Rebreathing* is necessary for two reasons: (a) economy, and (b) to *increase the depth of respiration by increasing the CO_2 content of the respired gases, thereby bringing more nitrous oxide and oxygen in contact with the blood in the lungs.* This is accomplished by having a rebreathing bag on the apparatus and a means of control of the inspiratory and expiratory valves on the mask. Instead of adopting the usual method of intermittent rebreathing, I have the valves arranged so that the expiratory valve can be either partly or wholly closed by means of a spring that can be gradually tightened by a small thumb screw; the inspiratory valve can be partly or entirely held open by a very simple device. By means of these valves, and by proper regulation of the supply of nitrous oxide and oxygen, the proportion of expired gases that enters the rebreathing reservoir is easily controlled.

6. An electric heater of special design is arranged so that all gases pass through it just before entering the rebreathing bag, thus allowing them to be efficiently warmed without danger of fire and explosion.



1. Three-way valve for regulation of ether.
2. Oxygen valve.
3. Nitrous oxide valve.
4. Air valve (for air-ether intratracheal work).

a. Mixing chamber containing water through which each gas bubbles, giving an easy and instantaneous method of estimating the amount of each gas being used.

b. Ether chamber. By means of valve 1 the gases may be allowed to pass around the ether chamber, they may be made to either partly or wholly pass over the surface of the ether, or they can be forced to bubble through the ether.

c. Reducing valve for nitrous oxide, covered with electric heater.

d. Mask and tube.

7. Adequate provision is made for the connection of the nitrous oxide and oxygen tanks to their respective reducing valves and for removing an empty cylinder and substituting a full one without any interruption of the use of the apparatus.

8. The coming importance of intratracheal insufflation anæsthesia renders necessary an arrangement for this form of administration of the anæsthetic in an apparatus that aims to be complete. The details of this part I shall reserve for another paper, merely stating that this apparatus is so arranged that air and ether or nitrous-oxide-oxygen and ether may be used intratracheally with perfect ease.

The use of the apparatus is very simple. One proceeds as follows:

Blow out all the dead air in the apparatus and fill the rebreathing bag with nitrous oxide. Apply the mask to the face with the valves so arranged that no rebreathing takes place; after a few breaths, when the air in the lungs is replaced by nitrous oxide, the mask valves are changed so that *partial* rebreathing occurs. As soon as cyanosis appears the oxygen valve is opened sufficiently to bring the patient up to a pink color. Frequently at this stage the ether valve must be partly opened for two or three minutes to obtain complete relaxation; as soon as this occurs the ether valve is closed and will often not need to be used again.

As the apparatus delivers a constant and an even flow of both nitrous oxide and oxygen the valves only occasionally need to be touched after the anæsthetist has once determined the proper mixture for maintaining the patient in a smooth surgical anæsthesia. In favorable cases I am often able to maintain a perfect anæsthesia, after I have determined the appropriate mixture, without changing the valves or doing anything but hold the mask in position, for periods as long as twenty minutes.

This *ideal anæsthesia*, while mechanically easy, is on the other hand only the outcome of much experience and an appreciation of the physiological problems of respiration. For some time yet, nitrous oxide anæsthesia must be considered a pioneer work and for those engaged in it a pretty exact knowledge of the recent physiological work on respiration should be required. Presently, however, as soon as a reasonably acceptable mass of empirical rules have been established in a given institution the administrators can, like our etherizers, be trained to work by "rule of thumb." I even believe that an institution that takes pains to establish a good set of "traditions" can shortly delegate gas-oxygen anæsthesia (like ether anæsthesia) to the house officer; although I appreciate the disadvantages of such delegation, yet I believe it is the only practicable method for large metropolitan institutions.

It is too early to dogmatize in regard to the method of administration or for the laying down of rules, so for the present I will merely enumerate the main considerations.

1. Nitrous oxide is a true anæsthetic, that is, its narcotic power is not due to asphyxiation. *Therefore any evidence or sign of asphyxiation* is not only unnecessary but *positively indicates*, as in anæsthesia with other drugs, that *something is radically wrong*. This means that, after the induction stage is passed, the patient should never be in the slightest degree cyanotic, that is, he should have a healthy pink color.

2. We must bear in mind that other symptoms aside from cyanosis must be looked for as an evidence of an excess of the drug. I wish to emphasize the fact that the patient may be receiving an excess of nitrous oxide, even if no cyanosis is present on account of the presence of oxygen.

3. The indications of an excess, which should be presumed to be dangerous, of nitrous oxide in the presence of oxygen are as yet only known in part. Those that I have observed are as follows:

a. *Labored respiration* with an accentuation of the *expiratory phase*. This labored expiration must be differentiated from a simply deepened respiration due to a slight increase of CO_2 from moderate rebreathing. (It may, in part, be due to an *excessive* increase in CO_2 caused by a too extreme rebreathing.)

b. *Cessation of respiration* will probably be found due to laryngeal or pharyngeal obstruction. As cyanosis in such an event supervenes with alarming rapidity no time should be lost in removing the mask and getting the tongue forward and administering oxygen. I have as yet never seen a cessation due to paralysis of the respiratory center, but am not prepared to say that it is impossible.

c. *Complete disappearance of reflexes and of muscular tonicity* for the present at least should not be permitted. I mean that the anæsthesia should not be deepened so that the face takes on the death-like condition of complete relaxation seen in deep ether anæsthesia. The eyes should never have that dangerous death-like look which all experimental workers so often see in an exaggerated degree in deeply anæsthetized animals. The corneal reflex should not disappear, in fact, the eyelids should quiver. In short, the patient should look natural both as to color and expression. Ordinarily speaking the relaxation should

not be sufficiently complete to allow dropping back of the tongue, as is the rule with ether. However, by skillful administration of the anæsthetic a sufficient relaxation of the abdominal muscles may be reached and maintained without loss of the reflexes of the face and throat.

d. *Vomiting* is more often a sign of a too deep anæsthesia than of a too light condition. It is especially apt to occur when the anæsthesia has been too much deepened by an excessive rebreathing; a single breath of fresh air on the appearance of the first signs of vomiting will often avoid it.

e. In patients readily susceptible to nitrous oxide there is no difficulty in getting into the blood a sufficient amount of the drug to produce a relaxed anæsthesia and at the same time have sufficient oxygen to maintain a good color. In other patients that are not so easily put under its influence a greater amount must in some way be introduced into the circulation.[1]

f. We have at our command two important methods of accomplishing this result:

(1) An increase in the volume and rate of respiration.

(2) An increase in the tension of the gases in the respired mixture.

(1) The increase in volume and rate of the respired mixture not only brings more nitrous oxide in contact with the blood in the alveolar capillaries but it also does the same with oxygen; therefore we can decrease the percentage of the oxygen in the mixture, thus making the mixture stronger, and at the same time get perfect oxygenation of the blood.

To increase the volume and rate of respiration we have at our command two respiratory stimulants:

(a) Carbon dioxide.

(b) Ether.

a. Carbon dioxide is very important in the regulation of depth of respiratory movement as shown by Haldane and his co-workers.[2]

By rebreathing a very slight increase in the percentage of CO_2 causes a marked increase in the depth of respiration. Many users from the time of Coleman (1868) have noted the advantage of rebreathing and have also made especial note of its economy; so far as I know I am the first to suggest that rebreathing is in many cases essential in order to get sufficient nitrous oxide into the circulation by increasing the volume of respired gases, so as to obtain a complete surgical anæsthesia.

b. Ether likewise in small doses causes an increase in the depth and the rate of respiration as is well known by etherizers from watching the primary stage of ether anæsthesia; I find that just opening the ether valve for a minute will cause a deepened and more rapid respiration and am sure that the relaxation that follows is due more to the deepened nitrous oxide narcosis than to the ether itself. Occasionally it is necessary to give sufficient ether in rebellious cases so that a true ether narcosis is added to that of the nitrous oxide; even to do this, only very small quantities are needed, so that the patient recovers very rapidly after removal of the mask.

(2) Paul Bert in 1878 showed conclusively the effect of increasing the tension of the gases. He administered a mixture of 80 parts nitrous oxide and 20 parts oxygen at a pressure increased by one-fourth above that of the atmosphere; the absorption of nitrous oxide was the same as if it were respired pure, while at the same time as much oxygen was absorbed as in breathing ordinary air. Under similar conditions Martin kept animals anæsthetized for periods as long as three days. This method of increasing absorption is practical only to a limited extent (about one per cent) when a mask is used.

From the surgical point of view the muscular action on the part of the patient in order to keep up respiration against this positive pressure interferes with the relaxation to such an extent as to make it an entirely undesirable method for surgical work; for dental work such pressure has been much used, and there is no reason why it should not be used, but apparently a good deal of trouble has resulted from assuming that this method of anæsthesia would serve for the surgeon.

[1] It is assumed that the face mask fits perfectly and that there is no leakage of air. The importance of excluding even the smallest addition of air is not always realized; it is the usual cause of failure to obtain a deep anæsthesia.

[2] If Henderson's theory of the influence of CO_2 on shock is confirmed its surgical application will assume great importance, and the question of carbon dioxide may deeply affect not only anæsthesia but operative surgery.

PHLEBECTASIS

Description of a Newly Modified Instrument for Use in Operative Cases

By GEORGE S. FOSTER, M. D., Manchester, New Hampshire
Surgeon and Pathologist to the Hospital Notre Dame de Lourdes

DILATED and tortuous veins are the seat of many evils and much discomfort. For many years the profession has been endeavoring to treat this condition to the satisfaction of the patient. Surgical, medical, and combined methods have been instituted. The relief has been marked in many cases, while other cases have gone on unbenefited.

Procedure along medical lines, that is, non-surgical, gives relief for a limited time. However, in the majority of cases, the venous trouble again shows itself as soon as support is removed or the occupation taken up again. I will therefore show that satisfactory results can be obtained only through surgical channels.

The old operation of dissection served fairly well. Many portions of the prominent veins could be removed, the scar tissue, which formed later, would contract and aid in obliterating the unmolested venous channels. This sort of treatment was good, but not what it should be.

It remained for Dr. C. H. Mayo to inaugurate the procedure of vein stripping. Dr. Mayo dissects down upon the extremities of the vein or veins in question. By the use of his instrument the tributaries are cut away and the larger vein removed. His instrument was made to use outside of the vein to be removed or stripped. Although only a small incision was needed for this operation, yet the vein could not always be removed intact. At times many small incisions were needed to pick the vein up where it broke off; also the tributaries were cut rather than torn, and subcutaneous bleeding was very apt to take place.

Since Dr. Mayo began the vein-stripping operation, numerous instruments have been put upon the market, carrying with them the same ideas that Dr. Mayo instituted. Many of these modified instruments have worked well, yet this progressive age is always looking for something new and improved.

After using and seeing used these vein-stripping instruments, the author conceived the idea of working within the veinitself rather than outside of it. It was with this idea in mind that the instrument, herein described, was improvised. Before entering upon the operative field the writer wishes to briefly review the anatomy, histology, and physiology of veins in general, touching upon the causes of phlebectasis.

ANATOMY

In reviewing venous anatomy, we need at this time deal only with those which are superficial. Therefore, only the veins of the lower limb will be covered. On the general principles, the anatomy which is applied to the internal, or long saphenous, and the external, or short saphenous, vein can be applied to all the superficial veins of the body.

The prominent, superficial venous channels of the lower limb can be likened to a river. As the volume of water in any river depends upon the number and size of its tributaries, so the amount of venous blood in each saphenous vein always depends upon the number of its tributaries and the amount of blood in them.

Two other conditions might also be considered, namely, the condition of the heart and the occupation of the patient.

The internal saphenous vein passes in front of the tip of the malleolus, over the subcutaneous surface of the lower end of the tibia, and then along the internal border of this bone to the back part of the internal condyle of the femur. The course of the sartorius muscle, represented by a line drawn from the posterior border of this muscle, on a level with the internal condyle, to the saphenous opening, is then followed.

The short saphenous vein lies behind the external malleolus, and from this follows the middle line of the calf to just below the ham. This vein is not generally so apparent beneath the skin as the internal saphenous. The valves in these veins, as in all the superficial veins, are not so numerous as in the deeper veins.

It is essential to keep in mind that both of these veins are accompanied by nerves, when making the incisions before stripping the nerve. If it is possible, the nerves should not be injured. Much of the pain which goes with the varicosity in this region is due to the close proximity of the nerves.

HISTOLOGY

The histology of veins varies widely in different parts of the body. Even veins of the same caliber may differ in histological formation. As

a matter of convenience, the histology of the average, medium sized vein will be described.

Every vein has three coats, namely, the intima, media, and adventitia. The *intima* or lining is composed of three distinct layers: (1) an inner layer of endothelium, (2) an underlying layer of muscle cells, interrupted here and there by connective tissue, (3) a fibrous connective tissue containing fewer elastic but more white fibrous connective tissue fibers than is found in arteries. The intima is limited externally by an internal elastic layer.

The *media* of veins is less highly developed than that of arteries. It contains muscle cells having a circular arrangement, which in some veins forms a continuous layer, while in others they occur as isolated fibers.

The *adventitia* is composed of an inner, longitudinal, muscular layer. This may be quite prominent and form the bulk of muscular tissue in the venous walls. There is also a preponderance of white fibrous connective tissue elements.

The *valves* of veins are reduplications of the intima and vary but slightly in structure upon their two surfaces. The inner surface, next to the blood current, is covered by elongated endothelial cells. The outer surface is made up of an endothelial lining of much shorter cellular elements. White fibrous connective tissue and elastic fibers go to make up the main structure of these valves. Flattened and circularly arranged muscle cells are met with upon the inner surface of many of the larger valves. The elastic fibers are more numerous beneath the endothelium on the inner surface of the valves.

PHYSIOLOGY

In dealing with the physiology of veins the vasomotor nerves are foremost. As has been shown, most veins have a muscular coat. It is over these muscular fibers that the vasomotor supply has influence.

If the vasomotor innervation can control the constriction and dilatation of arteries to a certain degree it might seem fair to assume that this would be true regarding veins. However, experimental work to date has failed to bring results from which any definite conclusions could be drawn.

The portal vein, physiologically an artery, receives vasoconstrictor fibers from the splanchnic nerves. This phenomenon has been clearly demonstrated by Mall. That the larger veins of the neck have vasomotor nerves has been shown by Roy and Sherrington. Possibly the large veins of the lower limbs have this innervation, yet it has not been clearly demonstrated. As at the present time little dependence can be placed upon the vasomotor nerve control of veins, we cannot bring this action into consideration in dealing with veins.

Having briefly considered the anatomy, histology, and physiology of veins, what conclusions can be drawn? From the anatomy of the saphenous veins it will be seen that sufficient valvular support is wanting. These veins are also fairly well exposed to extraneous influences. Muscular contraction, fibrous tissue scar formation, and the weight of any extra amount of adipose tissue may interfere with proper circulation of the blood through these channels.

Musculature, bodily weight, activity, and occupation all play their part in causing these veins to become tortuous and dilated. Is it any wonder, therefore, that these veins are so frequently involved? It is rather surprising that so many people, more especially women, are free from the condition.

From a histological point of view, veins are well supplied with elastic, fibrous, and muscular tissue. If this was not so we would have phlebectasis in every part of the body. The elastic tissue serves to preserve tone, while the fibrous tissue fills in the unsupported areas. Muscular fibers are always ready to do their part in retaining the normal equilibrium, and their presence in venous walls is no exception.

The physiology of veins will allow one to draw no conclusions of great importance. All we can state is that if it were certain that the vasomotor system did play an important rôle, it would be most beneficial here.

OPERATIVE TECHNIQUE

In the surgical treatment of varicosity the technique that is best systematized will yield the most pleasing results. To be sure, this is true in all fields of surgery, yet too much care can not be taken when stripping a vein. *First*, perfect asepsis is essential at all times; *second*, the point of incision should be carefully selected.

In stripping the long saphenous vein four skin incisions are generally needed. The four points selected for these incisions are: (1) about one inch below the saphenous, opening on the anterior, internal surface of the thigh; (2) about one inch above the internal condyle of the femur on the internal, anterior surface of the knee; (3) one inch below the head of the tibia on the internal surface of the lower leg; (4) two inches above the internal malleolus on the internal, anterior surface of the lower leg. If it be remembered that

Fig. 1. The instrument is about two feet in length and easily bent to accommodate all conditions. A represents the shoulder about which the vein is tied. That part of the instrument between A and B remains outside the lumen of the vein. C represents that portion of the instrument which enters the vein first. It is also the point used to exert traction from.

the long saphenous vein can be easily found beneath a line drawn in such a way as to equally divide the internal surface of the thigh and leg, it will never be hard to locate this vein. The only deviations are where it arches outwardly just below the saphenous opening and posteriorly at the knee, as it passes behind the internal condyle.

Third, the separate incisions need never be more than two inches in length, while in depth they need but pass through the integument. *Fourth*, the vein is best stripped by the internal or lumen method, thus leaving the adjacent nerves intact.

DESCRIPTION OF MODIFIED INSTRUMENT, WITH TECHNIQUE AS TO ITS USE

The instrument is about two feet in length and easily bent to accommodate all conditions. A represents the shoulder about which the vein is tied. That part of the instrument between A and B remains outside the lumen of the vein. C represents that portion of the instrument which enters the vein first. It is also the point used to exert traction from.

A No. 4 copper wire two feet in length is selected. At one end this wire is looped in such a manner as to produce a somewhat prominent shoulder. (See illustration.) This wire can easily be bent to fit all curves and accommodate circumstances. If desired, a properly plated instrument can be obtained from instrument dealers. The incision below the saphenous opening and that just above the internal condyle are made, the vein dissected out at these points, and raised, for convenience, by passing a director beneath the vein.

A No. 2 chromic catgut ligature is then used to tie off the vein at these two points. A minute, longitudinal incision is then made in the wall of the vein exposed through the upper incision and the unlooped end of the wire passed through this incision, down through the lumen of the vein to the lower skin incision. Here another minute incision is made in the venous wall through which the wire is allowed to come out. This wire is drawn down through the vein until the shoulder of the loop just enters the lumen of the vein at the upper incision, while the loop itself is not drawn into the vein. A No. 2 chromic catgut suture is then made to encircle the vein at the upper incision and tied tightly about the shoulder of the loop. All free catgut is then cut close to the knots and the vein is cut loose at the point of both incisions, leaving it free between them. The lower end of the wire is then grasped and by gentle, steady traction the upper division of the vein is stripped away.

By this method the vein is not turned wrong side out during the stripping, but, rather, the shoulder of the loop causes it to double upon itself so that as a result the vein is not torn or injured in the slightest. The stripping should always be done from above downwards, as all tributaries enter the saphenous vein at an acute angle with the apex pointing the way the stream flows. Thus when traction is made downward these tributaries are separated from the main vein at an angle opposite the direction of the blood stream. In this way these tributaries are occluded and subcutaneous hæmorrhage prevented. After the vein has been stripped it can be uncurled from the loop and examined, thus insuring complete removal. The catgut ligatures should be left long and anchored until the occluded portion of the vein has been stripped, when they can be cut and the raw ends allowed to retract.

After the upper division of the saphenous vein has been treated, the portion below the knee is stripped in the same manner from above downward. The same technique is carried out. The little free blood which may have escaped into the tract is gently squeezed out and the incision closed with silkworm gut. No drainage is needed. The skin is cleaned, the wound covered with sterile gauze and a fairly snug bandage applied, extending from the foot to the hip.

POSTOPERATIVE OBSERVATIONS

Very little pain is met with if the limb is allowed to rest gently upon an inclined plane. A cradle supports the bed clothing and the part is put at complete rest. Two dressings are made during the first eight days and the silkworm gut stitches removed at the end of this time. The limb is kept well elevated for three weeks. After this period the part is brought into use very gradually.

When the patient begins to walk he should be instructed to move slowly and rest often. When resting the limb should be kept elevated.

At the end of four weeks, massage is instituted, the limb being rubbed upward for its full length, twice daily. This treatment is continued for two months, during which time strychnine is given in the usual dose and general hygienic and tonic principles are instituted. Swelling rarely occurs if these instructions are carefully followed. The patient can return to his usual vocation in four weeks.

ADVANTAGES

The advantages of the method are sixfold:

First. The nerve which accompanies the vein is not irritated, and thus there is no postoperative pain.

Second. There is very little hæmorrhage.

Third. By using the wire loop and shoulder the vein curls upon a space of one and one-half inches. There is no danger of tearing the vein, the tributaries are occluded when separation occurs, and all bungling work is eliminated. The vein can be uncurled from the loop and carefully examined.

Fourth. The tributaries are torn away at an angle to the main channel, crushing the separated raw ends and leaving them fairly well ligated by this traumatism.

Fifth. In stripping the vein by this method the tributaries are torn and not cut. The extra incisions at times needed in other methods are not called for here, and there is no hunting for the broken end of the main vein.

Sixth. The small incisions leave very little scars after a proper length of time.

TRIFLES IN SURGERY CONCERNING A METHOD IN SKIN SUTURE

By WILLARD BARTLETT, A. M., M. D., St. Louis, Missouri

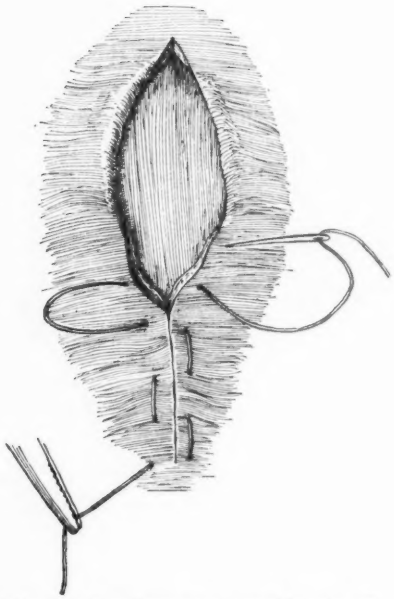
SINCE the suturing of the skin is such a small matter compared to work within the wound, it is frequently left to the assistant or performed almost perfunctorily by the surgeon himself. It is only in looking for the small and apparently unimportant things, in our attempt to perfect a surgical technique, that one is lead to halt in his interest in the apparently more difficult phases of surgery and consider for a moment the question of a special method in skin suture. In surgery, as in any very highly specialized art, one is impressed by the truth of the words uttered by that great painter and sculptor, Michael Angelo, "Trifles make perfection, but perfection is no trifle." The suggestion which I have to offer for your consideration, in the method of skin suture, is a very self-evident one; and its usefulness is apparent. This method may have been used before. However, its use is not common, as the author never remembers having seen it.

While the proper coaption of the deeper structures of a wound is most necessary, enough emphasis cannot be laid on the importance of a perfect approximation of the epithelial surfaces, in preventing the infection of the deeper structures of the wound by contact with the epithelium.

It is very frequently the case that the epithelium tends to turn inward, and this tendency is not sufficiently overcome when sutured by the ordinary tying or by the continuous suture. Small areas of the skin between the stitches are apt to curl in slightly and come in contact with the deeper structures, thereby causing delayed, imperfect or distorted union. In order to prevent this, a continuous suture of the following description, may be used:

The needle is introduced a little to one side at the very end of the wound; is brought under the skin to a point directly opposite, and the proper tension maintained to permit an easy falling together of the raw edges. After the needle has gone through both lips of the wound, it is then reversed and carried back in the opposite direction, through both lips. This procedure is then repeated as often as necessary. The accompanying illustration will perhaps give a clearer notion of just what is meant. As good a descriptive name as one could probably find for this suture would be "A continuous mattress skin suture."

In making use of this suture, one should be very careful of the tension, as the edges of the wound may be everted to an undesirable degree, if the stitches are pulled too tightly together. On the other hand, it furnishes a good tension suture. Each loop has in its grasp a certain amount of



Showing the "continuous mattress skin suture."

tissue, along the line of which the tension tends to be distributed, so there is little tendency of the stitch cutting through the wound.

A parallel may be drawn between this method and the accepted usage in sewing abdominal hollow viscera. The purpose is exactly opposite. The peritoneum must approach peritoneum, as every one knows, to secure proper healing; and the whole must be held inward in the proper position. This is accomplished by the use of the same stitch, simply inverted, so that what would appear on the under surface of a skin wound would correspond to the outer surface of the sutured viscera.

The special advantages of this method in skin suture are:

1. Being a continuous stitch, it lends greater speed to an operator than the interrupted stitch.
2. It acts as a good tension stitch, with little possibility of cutting through the tissue.
3. It leaves no cross scars. Small longitudinal scars are left, but these are generally not so unsightly.
4. It insures the desired approximation of the epithelial surfaces; prevents the turning-in tendency of the skin, and thus guards against the infection, through this source, of the deeper structures of the wound.

TRANSACTIONS OF SOCIETIES

WASHINGTON SURGICAL SOCIETY

REGULAR MEETING HELD OCTOBER 20, 1911, WITH THE PRESIDENT, DR. VAUGHAN, IN THE CHAIR

DR. SHANDS reported a case of myositis ossificans. The man in January, 1910, had fallen fourteen feet from a scaffold, suffering a bad bruise of thigh and having apparently ruptured a muscle in the middle third. In August he came to Dr. Shands, with a diagnosis of probable osteo-sarcoma for amputation; he had lost thirty pounds. A large bony mass eight or nine inches long could be felt, not movable and apparently attached to the femur. There was no pain, but he could not flex the leg and was lame. An X-ray showed the condition not to be osteo-sarcoma, and a diagnosis of myositis ossificans was made. The mass shown by Dr. Shands was removed by chiselling it from the femur; the patient made a good recovery; has regained normal weight and has practically normal use of the leg.

DR. GROOVER, who was introduced by Dr. Shands, showed a series of pictures illustrating points of diagnosis of various tumors and injuries.

DR. WHITE said that in some of these cases a growth seemed to follow the injury only to be later absorbed. He does not see the applicability of the name "Myositis" in this connection; for the condition is undoubtedly due to the tearing off of the periosteum.

DR. CARR mentioned a case of osteo-sarcoma of the first metatarsal bone which had been treated for rheumatism. He found apparent pulsation and thought the growth possibly an aneurysm, but the picture showed a bone tumor; an amputation above ankle was done, but there was abdominal recurrence. Many authorities say an osteo-sarcoma is never cured. He thinks two factors are necessary in the production of myositis ossificans: first, a rupture of the periosteum from a bone, and, second, a blood clot, giving the necessary conditions for bone formation. It is really an exaggerated callus, which takes the shape of the clot.

DR. VAUGHAN presented a hydrocele sac which he had recently dissected out. The case was of interest because it was the first case he ever had recur, the patient having had a button-hole operation a year previously. Dr. Vaughan had always considered this operation to be proof against recurrence. In this case he had dissected out the whole of the recurrent sac.

DR. FOWLER said the button-hole operation could be done under cocaine, and asked if Dr. Vaughan had any great difficulty in getting out the sac. Dr. Vaughan replied that he had not, and thought it would only be difficult in recent cases or where the sac was thin.

DR. SHANDS read the paper of the evening, "Atrophic Arthritis." (See p. 161.)

In discussion, DR. CARR said he had seen the first case reported by Dr. Shands; he said the villous growth was as large as an orange and soft and friable. The patient was walking about the street in nine days, without symptoms. He thought it a remarkable case.

DR. DUNLOP said he had been with Dr. Goldthwaite when he did his work on this condition. He did not quite understand what Dr. Shands meant by "Atrophic Arthritis," as various names have been used. Infectious arthritis and atrophic arthritis can be differentiated by the X-ray, and he thought possibly the third case reported might have been of the infectious type. Goldthwaite had found many cases of atrophic, hypertrophic and infectious arthritis associated with enteroptosis, and thought they might be due to defective metabolism.

DR. BALLOCH mentioned a case of a man of 55 showing a peculiar outward dislocation of both knees, in which a diagnosis of Charcot's joint had been made. A picture showed atrophy of bones in both joints. He had merely advised rest and immobilization.

DR. SHANDS said in closing that he had merely reported the cases, and had not attempted a classification. It was interesting to note that all these cases gave a traumatic history.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

FREDERIC A. BESLEY, M. D.

GEORGE E. BEILBY, M. D.	WM. R. CUBBINS, M. D.	AIMÉ PAUL HEINECK, M. D.
J. S. EISENSTAEDT, M. D.	FREDERICK G. DYAS, M. D.	G. T. COURTENAY, M. D.
FRED C. ZAPFFE, M. D.	JAMES F. CHURCHILL, M. D.	B. J. O'NEILL, M. D.
ARTHUR B. EUSTACE, M. D.	JOHN A. WOLFER, M. D.	H. A. POTTS, M. D.

Value of the Leucocyte Count in Acute Surgical Diseases. HERBERT W. HEWITT. *Annals of Surgery*, vol. liv, No. 6, December, 1911.

Within the last decade leucocyte counting in cute surgical diseases has acquired a new meaning, due largely to the recognition of the value of the differential count. For many years total counts only were made, and these yielded but little information, as their significance was not well understood. An ordinary furuncle might produce a high count, while a severe general peritonitis might reveal a leucopænia, and these facts could not be satisfactorily explained. Since a more complete blood picture has been utilized in the study of this class of diseases, valuable information as to the diagnosis and prognosis has been made available. The limitations of all laboratory work, however, must be recognized. The laboratory alone cannot, save in exceptional instances, make a diagnosis for the physician. The clinical findings must be correlated with those from the laboratory, and this is especially true of blood work in acute surgical diseases. It is necessary to carefully exclude all other conditions which might cause a departure from the normal.

For the purpose of this paper the author has used as a working basis an average normal, not only of the total number of white cells but of the polymorphonuclear cells. As the polymorphonuclear cells are principally affected in inflammatory diseases, they alone of the various types are considered in this study. In attempting to establish an average number of leucocytes which should be considered normal, the author found various writers at great variance. The total number ranged from 6,000 to 10,000 and the average normal percentage of the polymorphonuclears from 60 to 80 per cent. He therefore has used in this study 10,000 as the maximum normal number for the total count and 75 per cent as the highest normal percentage for the polymorphonuclears. The total count he considers as of little value, as it is influenced by many factors, notably the following:

A. Physiological leucocytosis: (1) leucocytosis of the new born, (2) leucocytosis of digestion, (3) leucocytosis of pregnancy, (4) leucocytosis after parturition, (5) leucocytosis of violent exercise, (6) leucocytosis of cold baths and massage, (7) terminal leucocytosis.

B. Pathological leucocytosis: (1) posthæmorrhagic, (2) inflammatory, (3) toxic, (4) malignant diseases, (5) due to therapeutic and experimental in fluences.

Then, too, in severe infections which are poorly resisted, a low total count is frequently observed; while in mild infections well borne, a high total count may be found, so that all these factors considered he places little value on the total count as a diagnostic or prognostic measure. He believes that the differential count, on the other hand, is of much value, since this is, as a rule, uninfluenced by physiological factors, and the changes due to the pathological conditions are more definitely defined. When both total and differential counts are taken and the relation each bears to the other is considered, the assistance rendered in the diagnosis and prognosis of the disease in question possesses a value vastly greater than either of the less complete and unrelated observations.

The following statements, the author considers, may be followed as safe general rules:

1. The total count is an index of the patient's resistance to the infecting organism.

2. The relative polymorphonuclear count is an index of the degree of, or the severity of, the infection.

3. If we have a relative polymorphonuclear count ranging between 75 per cent and 80 per cent, infection is probable; if between 80 per cent and 85 per cent, infection is usually found; if above 85 per cent, infection is almost invariably encountered, and this regardless of the total number of leucocytes. In fact, some laboratory workers do not make use of the total count at all, but depend for diagnosis entirely upon the differential count.

A few points can usually be decided by reference to both counts, namely:

a. Bodily resistance, whether high or low. *b*. Infection, whether severe or mild. *c*. Infection whether well borne or poorly resisted. *d*. Infection,

whether circumscribed or diffuse (e. g., appendiceal abscess).

The author reports one hundred cases from his own private records. The cases were all of the acute inflammatory type and were all brought either to operation or autopsy, so that the diagnosis has been either confirmed or disproved. In a number of cases many counts have been made, but the count made immediately before the operation has been the one considered in this series.

The author presents a number of tables comprising all sorts of acute pelvic and abdominal suppurative conditions. The total leucocytes vary from practically a normal or ten thousand to over twenty thousand, while the polymorphonuclears in practically every instance are between 82 and 87 per cent. It seems that these averages are significant. Excluding the counts in stitch abscess and puerperal sepsis, the following points are noted: In acute inflammatory diseases in the pelvis the polymorphonuclear counts are low. When we approach the appendiceal region the count is higher, but when we reach the "attic" of the abdomen our records show very marked increase in both total and polymorphonuclear counts.

The author asks this question: "Can we place the percentage of polymorphonuclear cells at a certain number below which we do not expect to find infection?" He quotes Sondern, in this respect, as follows: "A relative percentage of polymorphonuclear cells below seventy with an inflammatory leucocytosis of any degree excludes the presence of pus or gangrene at the time the blood examination is made, and usually indicates good bodily resistance toward infection."

In the writer's opinion, in acute inflammatory surgical diseases repeated counts at frequent intervals should be made, and if the polymorphonuclear percentage rises while the total number remains stationary or falls, immediate operation should be insisted upon.

From this study the author draws the following conclusions:

1. The laboratory findings must be correlated with the clinical to be of any value at all.
2. The total count alone is insufficient.
3. The differential count, per se, is of value in diagnosis, but of little value in prognosis.
4. The total and differential counts, when taken together and correlated with the clinical findings, are frequently of great value both in diagnosis and prognosis.
5. No definite percentage of polymorphonuclear cells can be taken to positively indicate infection. If we have a percentage of between 75 and 80 of polymorphonuclear cells, infection is probable; if we have a percentage of between 80 and 85, infection is usually found; if we have a percentage above 85, infection is almost invariably encountered.
6. The duration of the infection must be taken into consideration.

Counts are most positively diagnostic when taken early in the course of an acute surgical disease. Infection will frequently, when of long duration, overcome the patient's resistance and so vitiate the value of the count. GEORGE E. BEILBY.

Tuberculoma and Primary Cold Abscess of the Abdominal Wall (Tuberculomes et abces froids primitifs de la paroi abdominale). M. M. SAVARIAUD. *Sem. Med.*, 1911, xxxi, 589.

The writer reports three cases which he has seen within the last two years and mentions several others, the total number amounting to twenty-one cases. The condition is met with at all ages. In some cases tuberculous tendencies have been noted. The abscess is situated in the lateral wall, more rarely about the umbilicus. It can occupy any layer of the wall. The bacillus reaches this location by way of the blood in most cases, but may come as an extension of tuberculosis from the neighboring lymph glands. The first symptom is pain, which ceases when the tumor has reached a certain size. The size of the tumor rarely exceeds that of an egg or an orange. Two clinical forms are seen: first is a solid tumor, the second is fluid, which fluctuates at the apex and is indurated at the base. The tumor is immobile, follows the respiratory movement and is fixed by the contraction of the muscles, at which time it tends to somewhat disappear. The course is chronic or subacute, amounting to many months or even a year. It may simulate almost any tumor of the abdominal wall or of the abdominal viscera. After the diagnosis is made operation with curetment of the abscess wall usually brings prompt relief. The prognosis is good, though a hernia may develop if there has been much destruction of the abdominal wall.

Studies on Peritoneal Adhesions (With a Contribution to the Treatment of Denuded Bowel Surfaces). EDWARD H. RICHARDSON. *Annals of Surgery*, vol. liv, No. 6, December, 1911.

The problem of peritoneal adhesions is one that merits the serious consideration of everyone engaged in abdominal surgery. That this fact is generally recognized is indicated by the large number of valuable contributions to the subject — including not only elaborate experimental researches of the most diversified sort, but also carefully recorded clinical observations — contained in the literature of the past twenty-five years.

It was the author's purpose in this communication to present a collective and analytical review of the literature and classify along practical lines, to impartially weigh the evidence, and to draw such conclusions as seemed warranted. In connection with this critical study he describes a new and original method of dealing with denuded bowel surfaces. He believes that much of the existing confusion could have been avoided if investigators had kept in mind the fact that peritoneal adhesions, like bacteria, are of two kinds — those which are

useful and of essential worth to mankind, and those which are harmful and injurious to life or health. They represent in every instance nature's best method of defense or repair. In dealing with peritoneal adhesions the abdominal surgeon will find that he has recourse to three classes of procedure: (1) measures which prevent adhesions, (2) measures which restrict their formation to the harmless varety, and (3) measures which aid in their sorption.

Before taking up these various procedures, the author considers the various characteristics of the peritoneum itself which have an important bearing upon this problem, as, for instance, the enormous area of this serous membrane, which has been estimated to be only slightly less than that of the skin, its great absorptive power and the well-known ability of the peritoneum to successfully cope with infection without itself being seriously or permanently damaged.

The studies of the author and of various other investigators point to the fact that peritoneal surfaces may agglutinate with destruction of the endothelial layer, but in true adhesions the endothelium is always destroyed. If, however, the basement membrane is destroyed also, Richardson believes that the adhesions may later separate, otherwise the union is rendered permanent through the formation of fibrous tissue. It seems to him therefore that the pathological changes involved in the process of adhesion formation in the peritoneal cavity are in order of sequence: (1) injury or death of the surface endothelium, (2) pouring out of coagulable exudate, (3) agglutination, (4) organization, (5) fibrous tissue formation, which terminates ultimately in (6) a contracted scar. Observe that the whole process is dependent upon, and subsequent to injury to, the surface endothelium.

It is therefore necessary to consider the various agencies ordinarily coming in contact with the peritoneum that might be considered injurious to the vitality of the endothelium. These are principally (1) blood, (2) sutures and ligatures, (3) eschar of the thermocautery, (4) air, (5) infection, (6) mechanical, chemical and other agents.

The author considers each one of these agencies and their relative importance and then draws attention to certain prophylactic measures which at once suggest themselves; as rigid sepsis, avoidance of mechanical, chemical or thermic trauma, careful covering of all denuded surfaces, use of moist, hot gauze, avoiding of the exposure of the peritoneum to air. Thus far practically everyone is agreed, but the common experience that the troublesome and dangerous adhesions still quite frequently occur in spite of the strictest possible observance of these measures has led investigators to undertake the most varied and elaborate researches with the hope of discovering some prophylactic or remedial agent that would prove efficacious in all cases. This of course is a vain hope. Nevertheless, this work has resulted in the production of many ingenious and valuable procedures, all of which have at one time or another been enthusiastically advocated, and have received varying degrees of support from the profession generally. These heterogeneous devices are grouped as follows:

Non-absorbable protective membranes, as silver foil, solutions of gutta percha, xylol, carbon sulphide, etc.

Manual and postural arrangement of the viscera.

Peristalsis, encouraged by the early postoperative administration of various cathartics, the use of physostygmin, systematic massage, etc.

Normal salt solution. Large quantities of physiological salt solution poured into the abdomen at the end of the operation, in order to float the loops of bowel into their normal relationship and to keep denuded surfaces separated, were at one time extensively used.

Gases. The author noted that Bainbridge has recently advocated distending the abdomen with oxygen gas just prior to complete closure of the peritoneum, as a useful resuscitating and anti-adhesion measure.

Lubricants. These include lanolin, paraffin, olive oil and vaseline.

Non-viable animal membranes, the so-called Cargile membrane, made from the peritoneum of the ox, a similar membrane made from the shark's peritoneum, goldbeaters skin, derived from the outer coats of the cæcum of the ox, and a finely woven cloth made of catgut constitute the members of this group.

Viable grafts. The author believes that a much more rational procedure is to cover raw surfaces by plastic operations on the peritoneum, or with peritoneal or omental grafts. He corroborates his opinion by experimental work of other investigators and lastly reports a new method of treating denuded bowel surfaces.

This consists briefly in splitting the peritoneal leaves of the mesentery and using one leaf to suture over the denuded surface, or where this is impracticable, a plication of the mesentery or a peritoneal envelopement of the bowel with both layers of its mesentery. He states that these peritoneal flaps may be safely extended to include nearly one half the circumference of the bowel and three to four inches in continuity. There is no apparent reason why it should not be repeated as often as necessary at different levels of the intestinal tract.

In view of the rich vascular anastomosis and the mobility of both the bowel and its mesentery, if care be exercised in placing the sutures so as to avoid the trunk vessels, the effect upon the circulation is negligible.

Stability and permanence of the coaptation are readily secured through intelligent disposition of the sutures. GEORGE E. BEILBY.

BOOK REVIEWS

A Manual of Gynecology. By Thomas Watts Eden, M. D., C. M. Philadelphia: P. Blakiston's Son & Company, 1911.

Eden's Manual of Gynecology makes its initial bow to the medical public. It is written primarily for the student and medical practitioner upon a clinical and practical relationship rather than upon a basis of systematic pathology.

The sections dealing with operative treatment are given in outline only but they embody the experience and practice of the author and as such they are of great value to the general practitioner. The experience and knowledge obtained during a lifetime by a busy surgeon cannot fail to be helpful to his colleagues.

It is a pleasure to note that in the treatment of chronic endometritis, the curette is relegated to a minor position. Attention to hygiene, diet, etc., is recommended, while the curette is used only for hæmorrhage or chronic non-suppurative inflammation in other pelvic structures.

The prolonged palliative treatment in acute pelvic infection is recommended for those able to do so. In the poorer classes, the surgical procedures are indicated. The vaginal route is rightly chosen in these cases because of the great danger of peritonitis by way of laparotomy. Chronic pyosalpinx is extirpated by laparotomy and if both tubes are involved the uterus is removed at the same time.

A chapter is given to extrauterine gestation. Eden advises operation in case of internal hæmorrhage of the diffuse type. If the condition is very unfavorable, he waits 12 hours and if the bleeding is arrested, operation is deferred until the patient has recovered from her shock.

The book is an excellent assistant to the general practitioner who has little time or inclination to read the longer and more complex treatises.

Herbert M. Stowe.

Vaginal Celiotomy. By S. Wyllis Bandler, M. D. Philadelphia and London: W. B. Saunders Company, 1911.

In a very short preface to this new volume the author frankly offers his work as a conservative treatise, denying the extreme praise voiced by the most enthusiastic followers of the vaginal route in gynecological surgery, but at the same time deploring the relative neglect of this method by a large majority of operators. Whether it is true or not that vaginal celiotomy is almost completely neglected by a very large share of the surgical and gynecological world, the fact exists that in the literature at least this subject is slighted, compared to the great emphasis laid upon the possibly more brilliant abdominal work. Hence, this volume will go a long way to fill this literary gap, to bring vaginal section more nearly up to its proper place in surgical procedure.

As a text, little fault is to be found with Dr. Bandler's volume. Indications are set forth concisely in a systematic manner, safely on the side of conservatism, limitations of the various procedures are carefully pointed out, and results are stated briefly. As in every operative surgical work, technique is the thing chiefly described. Posterior vaginal celiotomy is first taken up, then the anterior, these two procedures occupying slightly more than one-half of the volume. The author's effort to keep the practical viewpoint ever before the reader is often apparent. Thus, in writing of vagino-fixation for descensus uteri he makes the two important points: (1) that with elongation of the cervix, a high (supravaginal) amputation of the cervix must first be done, and (2) that in cystocele it is necessary to render the anterior vaginal wall taut by a proper resection of the superabundant area.

Simple vaginal hysterectomy is next considered followed by disease of the adnexa. The indications and limitations of this second condition are carefully explained, ectopic gestation and ovarian cysts being included in the scope. Hysterectomy, myomectomy, and hysteromyomectomy are then technically discussed, and a final chapter is devoted to vaginal Cæsarean section. It is interesting to note that, differing from the English writers the author offers the term, "minor vaginal Cæsarean section," for the operation when done before fœtal viability.

The illustrations are each presented in full page reproduction, are semidiagrammatic in type, and so profuse as to render the work almost an atlas. These, with their accompanying descriptions, make it readily easy to follow Dr. Bandler's technique with little resort to the text. The type is large and clear with generous margins.

Carey Culbertson.

1000 Surgical Suggestions. By Walter M. Brickner, B. S., M. D.; with the collaboration of James P. Warbasse, M. D., Harold Hays, M. D., Eli Moschcowitz, M. D., and Harold Neuhof, M. D. New York: Surgery Publishing Co., 1911.

This work is evidently designed for the busy practitioner, and it will supply him with a very pleasant and profitable evening's entertainment. There is nothing new in the work; it simply brings to the reader's attention certain suggestions that may at times be overlooked in the ordinary routine of a busy day's work.

The text is so arranged and indexed that one can turn to any subject and find the suggestions as they appear. The suggestions are in the form of concise statements, to the point, and practically always say something which is of interest to the reader.

J. A. WOLFER.

A TEXT-BOOK OF OPERATIVE SURGERY FOR STUDENTS AND PRACTITIONERS. By Warren Stone Bickham, M. D., Phar. M. Third Edition. Philadelphia and London: W. B. Saunders Co.

In this book we have a very complete and systematic exposition of those surgical operations which have been tried and found best adapted to the particular disease or injury in question. The regional anatomy of the part is shown in exact detail so as to be of great value to students or infrequent operators, who only too often neglect salient points of technique because of its not having been clearly shown. As the author very aptly remarks, there are quite a few operators who are very sadly lacking in exact anatomical knowledge, and in this work they will find a very valuable aid. The division of the subject matter into general, which deals with vessels, bones, tendons, nerves and joints, and special, which describes those operations upon organs, also serves for clearness.

Just emphasis is also placed upon the incision and the dangers of a misstep in this line are clearly shown.

The illustrations of the operations are all well made and show the essential details with great clearness, especially those of intestinal anastomosis and vessel suture. The paragraphing and sub-heading of important points are also to be commended highly.

WM. R. CUBBINS.

PHYSIOLOGY AND PATHOLOGY OF THE SEMICIRCULAR CANALS. By Adolph E. Iberhoff, M. D. New York: Paul B. Hoeber, 1910.

The first eight pages are given to a review of the anatomy, histology and physiology of the semicircular canal and nose. The remaining pages are devoted to nystagmus, resulting from labyrinthine disease. There are three tables in condensed form by MacKenzie giving the differential diagnosis between labyrinth suppuration and perilabyrinthitis; labyrinth suppuration and neuritis of the eighth nerve; labyrinth suppuration and cerebellar abscess. The differential diagnosis between oscillating or optical nystagmus and rythmic or vestibular nystagmus, caused by syphilis, leukemia, hereditary ataxia and multiple sclerosis, is very clearly set forth as are also the various tests for these conditions, though the paucity of detached descriptions of experimental methods and apparatus is to be deplored. Nystagmus of labyrinthine origin is a comparatively new study and opens up a new field for scientific inves tigation.

This work is a valuable addition to the armamentarium and well worthy the perusal of aurist and ophthalmologist. The subject matter in the absence of better descriptions is altogether too technical to be appreciated by the general practitioner. Neurologists and surgeons, however, will find much of interest to them, especially in the differential diagnosis between labyrinthine disease and diseases of the brain and meninges.

H. P. BAGLEY.

OBSTETRIC NURSING. A Handbook of Obstetric Nursing for Nurses, Students and Mothers. By Anna M. Fullerton, M. D. Seventh revised edition. Philadelphia: P. Blakiston's Son & Co., 1911.

The basis of this well-known text is the course of instruction formerly given by the author to the pupils of the training school for nurses connected with the Woman's Hospital, Philadelphia. In this new edition careful revision is evident, especially in the chapters devoted to eclampsia, ophthalmia neonatorum and the care of premature infants. New formulæ for modified milk have been substituted for the old in the chapter on the care of the new-born infant. Another notable advance in the effort to bring the volume up to date is a description of Bier's method of suction hyperæmia in the treatment of abscess of the breast. Two entirely new chapters have been added, one on "Examination During Pregnancy" the other, "Obstetric Operations." Both of these add perceptibly to the value of the volume. The chapter on "Accidents and Emergencies of Labor" is peculiarly well presented from the nursing point of view, the resuscitation of the asphyxiated child being as well described as possible.

Many new illustrations are employed in the present edition and diagrammatic sketches are frequent. Altogether, this volume ranks with the first of the texts on obstetric nursing.

CAREY CULBERTSON.

A MANUAL OF SURGERY. By Francis T. Stewart, M. D. Second Edition. Philadelphia: P. Blakiston's Son & Co.. 1911.

The author has partially solved a very difficult problem — a big little book on general surgery. For such a brief work, it is complete and new. He takes up such subjects as diagnosis in a brief, yet thorough way and the student especially will benefit by the conciseness of the text. He enters immediately into the discussion of the topic, with few words, simply written and to the point, that leave no doubt in the reader's mind. He gives little attention to long and complicated theories but clings to the time-honored and proven principles of surgery.

The chapter on tumors and cysts is exceptionally good for such a brief work. Practically every surgical topic is given more or less consideration depending on its importance. The text is illustrated by a number of excellent cuts, which are especially instructive in regard to operative technique.

One must truly say, after reading the book, that the amount of information is enormous, although the text is brief.

J. A. WOLFER.

CLINICAL CONGRESS OF SURGEONS OF NORTH AMERICA

ALBERT J. OCHSNER, M. D., President — EDWARD MARTIN, M. D., President-Elect
JOHN G. CLARK, M. D., Vice-President — GEORGE E. BREWER, M. D., Vice-President-Elect
FRANKLIN H. MARTIN, M. D., General Secretary
ALLEN B. KANAVEL, M. D., General Treasurer
A. D. BALLOU, General Manager

Third Annual Meeting to be held in New York City, November 11 to 16, 1912

COMMITTEE ON ARRANGEMENTS FOR THE NEW YORK MEETING

GEORGE E. BREWER, M. D., Chairman

JOSEPH A. BLAKE, M. D.
GEORGE WOOLSEY, M. D.
ROBERT T. MORRIS, M. D.
BROOKS H. WELLS, M. D.
JOHN O. POLAK, M. D.
FRANK HARTLEY, M. D.
ELLSWORTH ELIOT, JR., M. D.
CHARLES H. PECK, M. D.
H. C. TAYLOR, M. D.
WILLIAM M. POLK, M. D.
L. W. HOTCHKISS, M. D.
VIRGIL P. GIBNEY, M. D.

WILLY MEYER, M. D.
HOWARD LILIENTHAL, M. D.
JAMES MARKOE, M. D.
E. B. CRAGIN, M. D.
JOHN ROGERS, M. D.
G. D. STEWART, M. D.
LEROY BROUN, M. D.
LOUIS J. LADINSKI, M. D.
JOHN E. WEEKS, M. D.
JAMES F. MCKERNON, M. D.
W. H. BISHOP, M. D.
ROBERT L. DICKINSON, M. D.
FRANKLIN H. MARTIN, M. D.

A. T. BRISTOW, M. D.
L. S. PILCHER, M. D.
CHARLES N. DOWD, M. D.
JOHN F. ERDMANN, M. D.
F. E. SONDERN, M. D.
PARKER SYMS, M. D.
E. L. KEYES, JR., M. D.
J. BENTLEY SQUIER, M. D.
E. W. STUDDIFORD, M. D.
WALTON MARTIN, M. D.
ALFRED S. TAYLOR, M. D.
L. G. COLE, M. D.

ON January 13th, the New York Committee on Arrangements convened, and organized. A few of its important committees were appointed and details considered. The scope of the General Committee's views on its important work can best be ascertained by scanning the sub-committees. One important department of the work is indicated by the division of the Committee on Hospital Clinics of the Congress. This Committee, it will be observed, is divided into six distinct sub-committees, covering the following branches: General Surgery, Gynecology and Obstetrics, Orthopedic Surgery, Genito-Urinary Surgery, Surgery of Eye, Ear, Nose and Throat, and Surgical Research and Laboratory Demonstration. This is the outcome of a general discussion of the subject at the time of the General Committee's first meeting when it was argued that New York City had facilities with which to make a complete clinical meeting in each of these branches of surgery and by organizing each of the specialties of surgery to its maximum strength, the Congress would be made attractive to all specialists in surgery. By combining the clinical programs of these separate divisions a comprehensive program would be formulated that could not fail to appeal to all interested in clinical surgery and make the Congress as a whole of transcendent attractiveness.

By this division of work it is the intention of the committee to make the program so complete in each of these branches that any one practising exclusively in general surgery, gynecology, obstetrics, orthopedic surgery, genito-urinary surgery, surgery of the eye,

ear, nose and throat or surgical pathology, can attend the Congress and devote his entire week, if he so desires, with his time profitably occupied in witnessing work in his own specialty. This refinement in the division of the work will also add to the value of the clinics to the general surgeon, and to the general practitioner and internist who is interested in any branch of surgery as a border line subject.

DATE OF MEETING

The second week in November, 1912, from the 11th to the 16th inclusive, is the time chosen for the third meeting of the Clinical Congress. The clinics will begin on Monday and close on Saturday evening. This will give those in attendance a continuous week of clinics without a break and the travelling to and from New York can be done on Saturday or Sunday. Provision will be made to have the clinics and demonstrations for the Monday clinics bulletined early on Saturday afternoon of the week previous to the meeting. The time of meeting can be fixed in the mind of the prospective attendant by remembering that it is the week following the presidential election in the United States.

HEADQUARTERS

The headquarters of the Congress will be at the Waldorf-Astoria. In order that there may be no confusion because of lack of space for registration, evening meetings, and bulletin space, committee meetings, etc., the management of the Waldorf-Astoria has reserved for the use of the Congress during the entire week, the Grand Ball Room, the Waldorf Apartments and the Astor Gallery. The large literary evening meetings will be held in the Grand Ball Room which will seat two thousand people and smaller audiences can be accommodated in the other available rooms.

THE LITERARY EVENING PROGRAMS

There will be five important evening programs which will include symposia on several important surgical subjects. Those selected for contributions to these programs will be selected from among the surgeons of the world because of their special fitness and reputation in handling the subjects selected for discussion. It is expected that several European surgeons will appear on one or more of these programs, while some of the most representative men of our country will take prominent parts. The large meetings will all be held as has been stated at the headquarters of the Congress where there will be every facility for accommodating the audiences, and the programs will be under the direct supervision of the Congress.

SUB-COMMITTEES

Committee on Hospital Clinics.
- ELLSWORTH ELIOT, JR., M. D. — General Surgery.
- LEROY BROUN, M. D. — Gynecology and Obstetrics.
- VIRGIL P. GIBNEY, M. D. — Orthopedic Surgery.
- J. BENTLEY SQUIER, M. D. — Genito-Urinary Surgery.
- JAMES MCKERNON, M. D. — Surgery of Eye, Ear, Nose and Throat.
- JOHN ROGERS, M. D. — Surgical Research and Laboratory Demonstration.

Committee on Scientific Meetings.
- FRANKLIN H. MARTIN, M. D.
- WILLIAM M. POLK, M. D.
- GEORGE WOOLSEY, M. D.
- WILLY MEYER, M. D.

Committee on Publicity.
- PARKER SYMS, M. D.
- JAMES MARKOE, M. D.
- ROBERT T. MORRIS, M. D.
- HOWARD LILIENTHAL, M. D.

Committee on Public Press Reports.
- GEORGE D. STEWART, M. D.
- E. B. CRAGIN, M. D.
- CHARLES N. DOWD, M. D.
- A. T. BRISTOW, M. D.

Committee on Finance.
- HOWARD C. TAYLOR, M. D.
- W. H. BISHOP, M. D.
- JOHN F. ERDMANN, M. D.
- BROOKS H. WELLS, M. D.

Committee on Brooklyn Hospital Clinics.
- R. L. DICKINSON, M. D.
- LEWIS S. PILCHER, M. D.
- JOHN O. POLAK, M. D.

ANNUAL SUBSCRIPTION: UNITED STATES AND CANADA, $5.00; FOREIGN, $6.00 (25 SHILLINGS)

Volume XIV MARCH, 1912 Number 3

Surgery, Gynecology and Obstetrics

EDITORIAL STAFF

FOR AMERICA

John B. Murphy, M.D.

E. Wyllys Andrews, M.D. J. Clarence Webster, M.D.

L. L. McArthur, M.D.	E. C. Dudley, M.D.	Frederic A. Besley, M.D.
A. J. Ochsner, M.D.	C. S. Bacon, M.D.	William R. Cubbins, M.D.
John Ridlon, M.D.	Cecil v. Bachellé, M.D.	John C. Hollister, M.D.
Thomas J. Watkins, M.D.	Carl Beck, M.D.	Rudolph W. Holmes, M.D.

FOR THE BRITISH EMPIRE

A. W. Mayo-Robson, C.V.O., D.Sc., F.R.C.S., London

B. G. A. Moynihan, M.S., F.R.C.S., Leeds John Bland-Sutton, F.R.C.S., London

Harold J. Stiles, M.B., F.R.C.S., Edinburgh Henry Jellett, M.D., F.R.C.P.I., Dublin

James Rutherford Morison, M.B., F.R.C.S., Newcastle-on-Tyne

Franklin H. Martin, M.D., Managing Editor

Allen B. Kanavel, M.D., Associate Editor

EDITORIAL AND BUSINESS OFFICES: 31 N. State Street, Chicago, Illinois, U. S. A.

PUBLISHERS FOR GREAT BRITAIN: Bailliere, Tindall & Cox, 8 Henrietta St., Covent Garden, London, W. C., England

Saunders' New Books

DAVIS' OPERATIVE OBSTETRICS

SCUDDER'S TUMORS OF THE JAWS

SCUDDER'S TREATMENT OF FRACTURES

THE NEW (7th) EDITION

DANNREUTHER'S MINOR SURGERY

Good Books You Need See Page 13

Entered as second-class matter June 29, 1905, at the postoffice at Chicago, Ill., under the Act of Congress March 3, 1897.

Copyright, 1912, by The Surgical Publishing Company of Chicago

Painless hypo-medication

is not yet a clinical fact.

Comparatively painless is.

To prove it take
one Hypo Tab Normal Salt S & D
one any other Hypo Tab S & D
ten minims of clean freshly boiled water, shake together a few seconds in a clean syringe and inject with your usual care and skill. You will then need no further "reasons why" so many doctors prefer H. T.'s made by

SHARP & DOHME
The Hypodermic Tablet People
BALTIMORE, MARYLAND

Wassermann Test

Owing to the large number of Tests which we are making for the Profession, we are now enabled to reduce our price to

$10.00

Upon request we will send you a sterile container and mailing case with instructions for collecting the blood from your patient.

Wassermann test for syphilis	$10.00	Blood count	$ 3.00
Urinalysis, chemical and microscopical	1.50	Tissues, pathological examination	5.00
Sputum and smears	1.00	Autogenous vaccines	10.00
Widal test for typhoid	1.00	Stock vaccines, per dozen	5.00

CHICAGO LABORATORY

8 North State Street, Chicago **Telephone Central 6239**

RALPH W. WEBSTER, M. D., Ph. D., Director Chemical Dept. · THOMAS L. DAGG, M. D., Director Pathological Dept. · C. CHURCHILL CROY, M. D., Director Bacteriological Dept. · ALTS B. CROY, M. D., Assistant

Fig. 2.

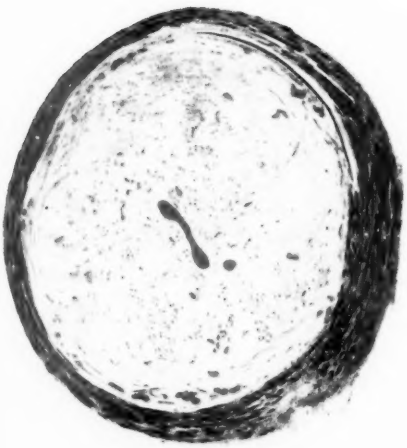


Fig. 3.

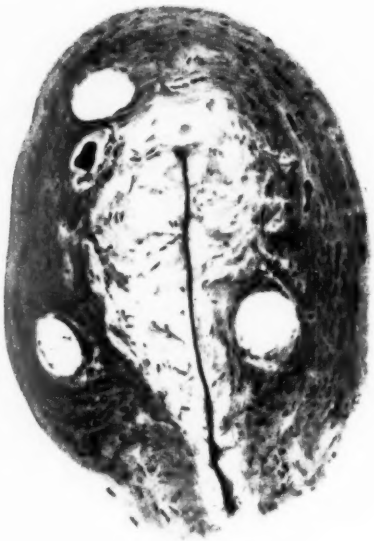


Fig. 1.